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DEPARTMENT OF AGRICULTURE OF THE PROVINCE OF QUEBEC
HORTICULTURAL SERVICE
AUGUST 1918

BULLETIN No. 44

— ON THE —

Cultivation of Vegetables

— BY —

FRANCISQUE PETRAZ
Landscape Horticulturist

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With the collaboration of
MR. J. H. LAVOIE
Chief of the Horticultural Service

Published by order of the Hon. Jos. Ed. Caron, Minister of Agriculture

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PART I

THE ESTABLISHMENT OF A VEGETABLE GARDEN

CHAPTER I

SELECTION AND PREPARATION OF THE GROUND

Location of the Garden

It being necessary to visit the garden daily in order to do what work may be required, to watch the appearance of diseases and insects so as to control and destroy them and to do the picking of vegetables, etc., everybody will appreciate the great advantage of the garden being located nearest to the house as possible. Several minor operations will be executed during spare time, which would not be feasible if it was distant and if we were prevented from visiting same. Results would then on longer prove satisfactory.

Much will be gained if we can convince ourselves that the cultivation of vegetable plants, which is not difficult, nevertheless requires continual attention. These plants do not have the same endurance as cereals and in order to have them tender and delicious they must absolutely be given particular attention—cultivation, watering, etc.—which will enable them to develop without stop; this is comparatively easy to do if the garden is close to the house.

Exposure

The garden with a northern aspect would be cold and would suffer from freezing winds in the spring; the crop would be endangered and delayed. This exposure must be avoided if possible, if not, the garden should be protected by the planting of trees as a wind-break, hedges or walls. Preference should be given to the Eastern or Southern exposure, which, freed from snow sooner and warmed up, will grow early products, superior in quality to those coming at a later date.

Soil and Improvements

Vegetables may be cultivated in all soils, providing they are improved when containing too much clay, sand or lime and drained when the sub-soil is impermeable.

Nevertheless the best soil for this culture is the one known as *clay loam*.

The compact clay soils, sandy and limy are less favorable. However, they can be all corrected: clay soils, by adding sand, coal ashes and lime; sandy soils, by mixing clay, cow dung; limy soils, by marsh-lands, turfy grounds, etc.

We must not think of changing thoroughly the nature of these soils with a single correction, but with perseverance and in repeating them during several years, it may certainly be done.

Liming

In certain soils not containing lime, in sandy and particularly in clay soils, the addition of lime is an excellent operation which considerably increases the fertility. Lime is not only a good improvement, but it has much to do with the destruction of insects and noxious weeds, favors the decomposition of vegetable refuse, oxidates minerals and corrects the acidity of the soil: which allows micro-organisms to take possession of same and make them assimilable to plants. Lime must amount to five per cent of the volume of any good land. In these times of dearth, nothing can do better towards increasing production at small cost.

To our mind, lime-kilns should be mobilized and new ones built so as to produce enough lime to provide for one ton to every acre of land in this Province; their output would therefrom be increased by one third. We have often used lime—again last year—and results have always proved profitable.

How to use it.—Gather limestones in small heaps about 20 feet apart, water and shovel upon 10 inches thick of earth; spread 15 days later and incorporate to the soil with a harrow.

Breaking up

A good breaking up of the sub-soil is indispensable particularly in compact and impermeable lands.

Rain-water must be able to find its way deeply under the roots of plants so as not to injure them and, in a loose soil that will drink in the water like a sponge, to provide, through capillarity, for the moisture necessary to the life of the plant in dry weather.

When this breaking up is done by hand, a trench must be opened, on the width of the garden, 3 feet wide and 1½ foot deep, and the earth taken out carried to the other end of the garden, where it will serve in filling the last ditch. Another stripe of 3 feet will then be brought down in the trench, while each clod is broken up to loosen the soil, and stones and roots of noxious weeds put aside. Finally, the earth will be dug at the same depth of 1½ foot and piled up on the precedent trench and so on until the whole work is completed. Let us note however that this breaking up will be done only on lands where the sub-soil is fertile.

In an opposite case, as it would be unwise to bring too much dead earth to the surface, only the arable earth would be removed, leaving that of the sub-soil in place, after it has been well worked to the depth mentioned.

Where the garden is of large area, this breaking up may be done with a plow: first with an ordinary plow which will work the soil very deep and afterwards with a digging plow which will work deeper in the same furrow, leaving the loosened earth in place.

This breaking up is of absolute necessity not only for vegetables but equally for all other field crops. This is the means of increasing the thickness of the arable layer, of checking the excess of moisture and dryness, of providing the plant with loose earth wherein roots will penetrate and spread easily, and will find an abundant supply of mineral fertilizers and all other elements which they require to develop and give the maximum yield.

This work, when done properly, will give excellent results during several years.

Plowing

The following years, one will be satisfied with ordinary plowings, either with a spade or a plow, preferably in the fall in all heavy soils and without breaking the clods so that they may be loosened by frosts. Sandy soils will be kept for the spring, at an early date however, so that they may be beaten enough to sow the seed.

The land that has been broken up must be plowed anew, before sowing or planting, as soon as the ground has warmed up, after the first mild days in the spring, incorporating manures at the same time. All clods must be broken up and the surface pulverized, either with a prong hoe and a rake or with the horse hoe and harrow.

Manures, Various Fertilizers

Manures employed must be well rotten, fat and oily. In order to have them such, they are deposited in heaps, the sides and angles of which are kept well perpendicular, and made up into layers properly pressed and watered. In clayey grounds, manures containing straw are rather injurious. An average manuring requires about thirty tons to an acre.

Certain vegetables require a greater quantity; others, such as onion, garlic, peas and beans only thrive in it when it has become a well-rotten compost. One ton of good manure contains 10 lbs of azote, 5.2 lbs of phosphoric acid and 12.6 lbs of potash.

These four elements: azote, phosphoric acid, potash and lime constitute the essential food plants and if no manures are available, this food must be provided them under the shape of fertilizers.

It has been estimated that 63 lbs of soda nitrate, 34 lbs of superphosphate of lime and

24 lbs of chloride of potassium equal one ton of manure.

Owing to the war, it is almost impossible to procure Nitrate of Soda and Potash.

However, poultry-dung, if kept aside and pulverised after it has thoroughly dried up, will prove an effective manure and could replace nitrate of soda. Ashes, rich in potash, may also be used to replace this product withheld by Germany. None should be lost. Soot also contains much potash and azote and, moreover, is a powerful insecticide. Soot is put in a bag, allowed to soak 12 hours into a barrel containing water, and sprayed on the infested vegetables, thereby destroying caterpillars, snails and many other pests. Poultry feathers constitute a high-azoted manure. Leached ashes and plaster also are precious improving elements.

Liquid manures

Manure juices, liquid manures, are active vegetation agents. They will be spread with 4 to 5 five times their bulk of water and used at night preferably. Excrements are still richer; diluted in 10 times as much of water, they largely activate the growth. All these manures, spread after the weeding of young seedlings, when roots are still weak and often displaced through the pulling of noxious weeds, procure them the necessary plant food which will enable them to develop rapidly. Under the name of "Tankage", slaughter-houses are producing a very powerful concentrated manure, formed of dried blood and flesh and bone dust; when spread on top near the young plants, its effect is immediate, if it is dissolved by rain or watering and drawn into the ground within reach of the roots of plants as soon as it is spread.

Mulch

Mulch is short manure, rather dry than fat, used to cover the ground under crop during the hot season, either with a view to intercept the drying rays of the sun, or again to prevent the ground from being hardened by rains or waterings and to enable it retain its coolness.

Seed-plots do well when sheltered by a thin layer of mulch because while retaining moisture it prevents seeds from being disturbed by heavy rains or waterings and facilitates their germination. It is spread as equally as possible and well divided. It will prove of the greatest usefulness on light, dry and sandy loams. It may be removed with a rake, once the seeds have grown up.

Compost

Compost is the result of the thorough decomposition of manures, leaves, grass and rubbish from the garden and which have assumed the state of fine earth. Compost from beds made up with horse manure is considered one of the best. It is used to cover seedings made in the open ground, which seed is small, protecting same and making their coming out certain. It is again used in new beds for seeding and transplanting, and mixed, for the cultivation of flowers and plants in pots.

As it is most necessary to always have a good quantity available, the pile will be prepared one year in advance.

Compost from leaves that are not thoroughly rotted is much sought for in the growing of certain flowers. It advantageously replaces the heath earth indispensable to a good many species of this kind.

Laying-out of the garden

The shape to be adopted in dividing the plots in the garden must differ according to its area and its destination.

We will divide them in three sections: *home gardens, farm gardens and market gardens.*

1.—HOME GARDEN

This garden is usually of small area, because those cultivating same do not own the land. For this reason they cannot spend any money to break up the ground, to plant trees and build up shelter-walls, etc., which might be done by those who, owning the ground, are able to establish a permanent garden. Asparagus, rhubarb, etc., shall therefore not be planted; but they will be satisfied with cultivating strictly annual vegetables.

The best plan to adopt for this kind of small garden consists in providing for a 1½ ft wide alley only, around the piece of ground and 3 ft from fences, thus leaving a single plot in the center with a bed all around, the latter intended for corn, tomatoes and pole beans.

The earth will be worked with a spade, if possible, and each strip properly turned over and crumbled so that it will be thoroughly loosened. When stones, weeds, have been removed and carried away, manures will be worked into the soil.

This work should be done as soon as the snow melts away and the earth warms up, but never prior or during a rainfall. All vegetable plants fear compact soils because they can never warm up, always remain muddy, impermeable to water and air, and harden like a brick, in dry weather.

When operating with a hoe, care should be exercised to break the clods not only in the soil, but also on top; this should be done as we proceed with the work so that they will not harden through the action of the air and sun.

Tools

As all this work cannot be done otherwise than by hand and owing to the small area to be cultivated, cheap tools will be all that is required; an ordinary spade or a digging fork–according when the soil is free from stones or not—a rake, a cord, a tracer, a hoe, a planter, a prong hoe and a trowel to displant plants in clods.

Dividing the plot into beds

When production is in mind, the French method of beds 3½ ft wide, separated by a 1 ft pathway, will certainly yield twice as much as the method of more distant rows, and this without any more work if the soil is of great fertility.

To share the plot, when plowings are done, stakes are driven down 4 feet apart along each pathway. When this has been done, the cord is stretched from one stake to the other so as to form the first bed. When the cord has been well stretched, the place of the pathway will be indicated by walking and pressing hard on each side of the cord. The bed is then dressed and levelled with a rake, and the small clods and stones that are found are thrown into the pathway. Seeding may be made broadcast or in drills more or less distant, as the space required by the vegetables to be grown will permit.

Last year, we have had a large crop in a garden layed out in this manner. Carrots, parsnips, turnips, golden thistle, beets, spinachs, lettuce, salsify, celery, sorrel, parsley, endive, etc., were 10 inches distant, or four rows to a bed; onions, garlic, shallots, leek, 6 inches apart, or 6 rows to a bed; peas and pole beans, swiss-chard, three rows to a bed; dwarf peas and beans, cabbages, cauliflowers, rutabagas, Brussels sprouts, also three rows to a bed; tomatoes, cucumbers and corn were planted 4 feet apart. In proceeding in this way we obtain from the soil all what it can possibly yield. This is the way gardeners cultivate in France, where nothing is wasted and every inch of ground occupied.

We expect to hear bitter complaints, but they will not prevent our recommending this method for all hand-cultivated gardens, estimating that it may be useful to those who will make it their own. This is intensive gardening; a crop must be replaced, as soon as the ground can be cleared, by another. Thus radishes as well as lettuce to transplant in endives, etc., will never be sown in plots, but hidden, that is, between other plants requiring a much longer time to grow up.

2.—FARM AND HOME GARDEN

This garden, intended to feed a large family, will be suffiently large to allow for a good walk lengthwise in the center, and another one crosswise, thus figuring a cross, providing for a watering pond in the center.

Another walk will be arranged all around the garden, 4 ft from the outer edge, thus leaving a border of that width, except to the north where the border should have 12 ft at least. This space will be destined to receive beds, transplantings, and later on, the plants requiring most heat; tomatoes, egg plants, pepper plants, etc., it being undestood that they will be sheltered by a stone or brick wall, a wooden fence or a hedge.

Fruits Trees (under small shapes)

We will then have our garden divided nto four plots from which we will deduct 4 ft to provide for a bed on each side of the central walks and upon which will be planted fruit trees and shrubs, under small shapes: spindle, column, pyramid, row and vase or goblet.

The wall to the North will be paled up with vine obliquely grown up and buried every winter which will allow us to have: grapes, pears, apples, cherries, plums, red and white currants, black currants and gooseberries, raspberries, etc.

On the surrounding border, we will plant apple trees grafted on Doucin stock and form pyramids with raspberry bushes between; apple trees grafted on French Paradise will make a continuous row; these things, found in any garden in France, are hardly known here and still less given a test, for want of practical knowledge, although we are sure of their successful results (it being a question of selection of varieties and particularly rational pruning).

Use to be made of the garden plots

1.—In the first plot will be planted to stay for many years; asparagus, rhubarb, sorrel, artichokes, strawberry plants.

2.—In the second, legumes requiring much fertilizers, manure particularly: cabbages, cauliflowers, Brussels sprouts, chard, celery, cardoon, spinach, etc.

3.—In the third, those fearing fresh manure but needing phosphoric acid and potash: garlic, onions, shallots, carrots, beets, parsnips, celeriac, rutabaga, salsify, endive, lettuce, peas, pole peas, dwarf and pole beans.

4.—In the fourth plot, which should be the hottest: melons, cucumbers, custard marrows and pumpkins, tomatoes, eggplants, red pepper, corn.

Rotation of crops

We will adopt the biennal rotation which is the most practical and good enough to obtain good results with vegetables. Knowing well that the same plants or plants of the same family should not be cultivated two consecutive years on the same ground, those on the second plot will be changed to the third, the following year; those from the latter being always put in a plot abundantly manured the year before, the same rotation being practised in the fourth plot which will divided in two parts for this purpose.

Flowers in the vegetable garden

Beauty never losing its rights, even in the garden, and knowing that there cannot exist really nice gardens without flowers, the available space between fruit trees on the beds bordering the central walks will be utilised to intercalate a few flowering shrubs, same good perennials, rose bushes planted to stay, as well as annual plants.

Flowering shrubs.—Selected amongst those of small size: Japanese Quince; *Spirea*: Lemoinei, Bumalda, Thumbergii, Prunifolia, Van Houttii, Weigelia amabilis; *Deutzia*: crenata, Lemoinei grandis; various Japanese hybrid and rugosa roses. Various lilacs will be planted in the angles.

Perennials.—Various tree and herbaceous paeonies, larkspurs (delphinium), lilies, iris, asters, poppies, phlox, chrysanthemums, gaillardias, lychnis, columbine, etc.

Bordering plants.—As there cannot be any attractive walks without borders of dwarf plants, we will put in double *La France* violets and others, dwarf campanulas, pasque-flower, cornflower and Canadian phlox, achillea, Caucasian doronicum, fleabane, dwarf iris, feathered pink, periwinkle, sedum, saxifraga.

Medicinal and melliferous plants.— These plants must also be found in large quantity, for the apiary and the house pharmacy: balm, mint, sage, rosemary, lavender, hyssop, fennel, thyme, wormwood, camomile, centaury, borage, perforated John's wort, etc.

All these aromatic or medicinal plants make delicious drinks, which are of the greatest use as domestic or veterinary medicine, They should always be at hand, because in several cases, they render real services, always bringing relief and sometimes preventing a serious illness.

This is the plan of the farm and home vegetable garden in a rough outline and which we would like to see on all farms in this Province. It will provide vegetables for the kitchen, fruits for dessert and canning, flowers to adorn the table and give friends and medicinal herbs to relieve all discomforts.

Well provided with vegetable plants, decorated with flowers and loaded with fruits, it will be the pride of the housewife, will make the pastime of the owner and the happiness of the children who will find in it an abundant crop of all the fruits of which they are so fond. They will learn to cultivate this pretty garden, and to like it and it will be a strong bond to keep them on the farm.

This garden, like the former, may be cultivated by hand and then divided into beds, or planted in more distant rows, cultivated with a wheel hoe, with 2 to 3 ft spaces, according to the kind of beds on which vegetables are grown.

3 —MARKET GARDEN

It does not include any trees or flowers: it is a commercial garden from which sentimentality is excluded.

All the plowing and breaking up operations are made by animal traction with an ordinary plow, digging plow (Pl. II fig. 33), horse hoe (Pl. II fig. 28), weeder and harrow. Rows must then be traced in the direction of the greater length so as to facilitate the work and planting must be made in rows 2½ ft apart and more.

The yield per acre will be inferior to that of the garden cultivated with the hand and divided into beds, but on the other hand, the cost of operating will be considerably smaller: it is rather field cultivation than gardening. Also, the walks should be wide enough to allow vehicules to move freely; they will serve for the trucking of manures and vegetable crops. The importance of the gardening should be the only guidance in providing for the number and the direction of walks; circus should be provided for here and there so as to turn about, without being obliged to go to the end of the fields to do so.

CHAPTER II

ORDINARY OPERATIONS

Sowing (general considerations)

Whatever may be the mode of sowing or the kind of planting, the preparation of the soil is of the greatest importance and upon it success is depending; it shall consequently not be neglected.

When planting either in the greenhouse, in beds or in the field three elements indispensable to germination, viz: water, air and heat, must be kept in mind. Too much heat and cold, dryness or moisture are harmful and may endanger the proper coming out of seeds. The same will happen if seeds are buried too deep, lacking of air. They must then be planted at a depth varying according to their size and the ground upon which the operation is being carried; always deeper in a sandy soil than in a clay soil. Any seed should, as a rule, be covered with twice its volume of earth.

Rolling

This operation is intended to press the earth around the seed and to bring the moisture of the ground to the surface, through capillarity which activates the germination of the seed. It is done after the seed is buried, in dry weather and in light grounds preferably; in heavy and moist lands it would be of a bad effect.

This work consists in pressing the earth either with the feet (walking close-legged), either with a boot, the back of a hollow shovel or with a hand roller.

Weeding and thinning

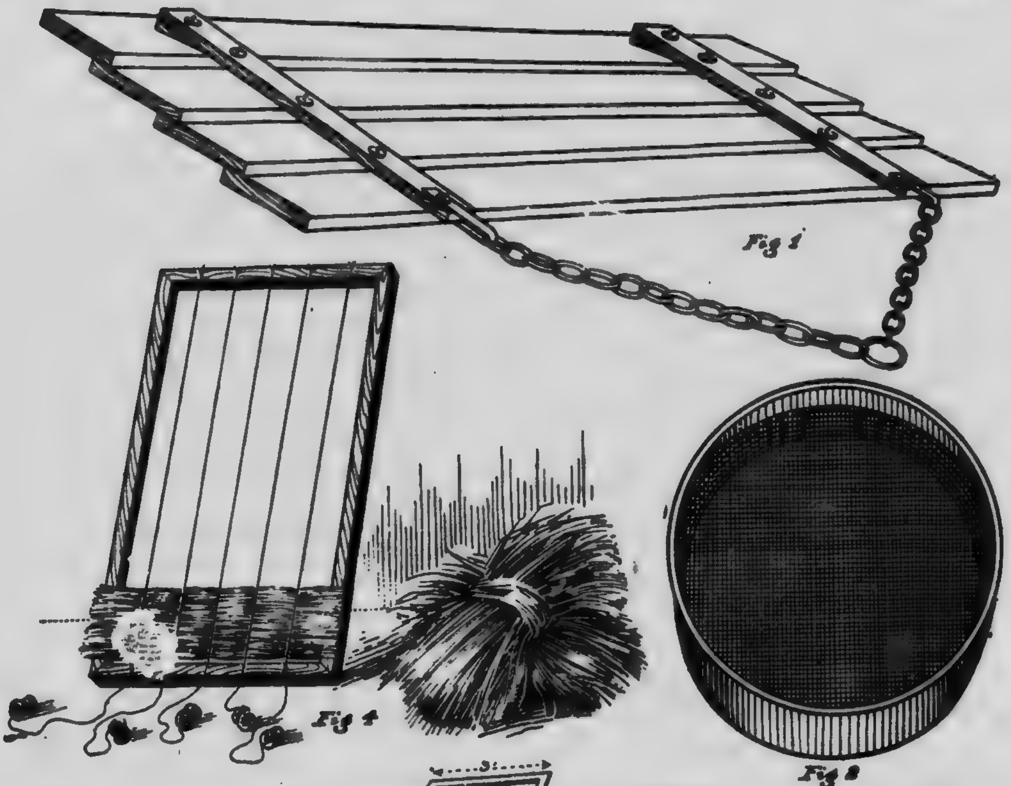
To weed is to pull out noxious weeds which may have come out amongst seedlings. This work must be done as early as possible when the plants are young so as not to shaken or lift seedlings too much. They are thinned at the same time if found necessary. This thinning operation requires a great deal of attention and some ability, so as to quickly distinguish the plants that must be removed. Women are generally more clever than men in this respect and do the work with greater dexterity. In summer time, when the earth is dry a watering is given a few hours before commencing the work so that the surface earth may have time to warm up.

This work must not be done when the heat is too great, because many plants, lifted while operating, would dry up, but preferably when the weather is cloudy or at night. The coolness of the night and the dew will permit them to rise up again.

Nevertheless, plants must always be watered after weeding. To assist them in quickly recovering, nothing can equal, prior to a rainfall, a watering with liquid manure diluted in four times its volume of water or poultry manure well pulverised and mixed with sand or earth and spread at the surface around the plant.

Hoeing

Hoeing is a surface plowing intended to loosen the earth around the plants, to destroy weeds and to prevent the evaporation of moisture contained in the soil. This operation must be frequently done to a depth of 1 to 3 inches only; in working more deeply, one would risk to cut the roots of plants, which would stop their growth. One must not hoe when the earth is wet, but wait until it has well warmed up and after the dew has fallen. Experience has shown that when plants had thoroughly warmed up, hoeing was of greater benefit to them. Frequently repeated, it contributes to the rapid and continuous growth of plants. Earth newly turned over gets nitrified and is consequently a contribution of azote. Moreover, it has been admitted that a hoeing is worth a watering, it is also a means to prevent dryness.



Figs: 1.—Planker to level the surface of the soil before sowing; 2.—Sieve to sift the compost for beds; 3.—Hotbed surrounded by a heater; 4.—Frame for making straw-mats; 5.—Straw-mat; 6.—Protection wall for hotbeds and how to make cold frames; 7.—Glass bell to protect transplanted plants and force them.

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CHAPTER III

MEANS TO HASTEN AND ACTIVATE THE VEGETATION OF PLANTS

Beds

A good many vegetable plants from warm countries would not yield a sufficient crop if only sown in the open when the earth and temperature would have warmed up sufficiently; but in planting them a few months earlier in beds, towards the end of the winter fine plants will be obtained which, set in place in June, will perfectly mature or yet produce for a longer period. In using beds, we can yet have very good vegetables two months earlier than in the open ground.

Location of the bed

The bed must be placed in that part of the garden where it will receive the greatest supply of sun and where it will be sheltered against the northern winds. If such a shelter was not existing, a temporary one will be made with boards. Beds are prepared from the 1st to the 30th of March, according to the region of the Province. When the spot is selected and the snow covering same cleared away, one will bring on the ground the manure that will furnish the artificial heat to be used.

Manure for beds

Horse manure is the best. The one from horses doing hard work and consuming much oats is the warmest. Manure piled up in heaps that has already fermented is valueless for this purpose. The most susceptible of giving much heat is the one just out of the stable. In case of our not having a sufficient quantity, it could be mixed with other from a pile; but whoever has beds to make must foresee it, provide in advance for the necessary manure and prevent its fermentation. This will be obtained in piling up same like a wall on a small width, or again in piling it up in alternate layers separated by crossed poles, so as to allow the air to circulate freely and prevent fermentation

Hotbeds

The manure required for the bed we intend to make being on hand, we must then mix it thoroughly with a fork, a few days in advance. If dry leaves are available, some will be added to equal one third. This will result in a more moderate heat lasting for a longer time.

The location being selected and its sides drawn with a cord (2 ft in excess of the frames that will be placed in), manure is then deposited in layers, being careful to shake each forkful and spread the manure equally all over the surface, so that the parts soaked with liquid manure be well mixed to the drier ones, and to constitute a perfectly even layer. Each forkful layed on the ground is strongly pressed upon with the back of the fork throwing in the straws that might come out. When this first layer, 1 ft thick, has been deposited, it is pressed down, watered and a second layer placed on top in the same manner as previously and so on until the desired thickness, which varies according to the time of the year, has been reached: 2½ ft at the beginning of March, 2 ft at the end of the same month and 1½ ft in April. This thickness will also change according to our intention: whether of sowing or transplanting.

The last layer of manure being laid down, well pressed and levelled, then the frames are placed. A thin layer of manure is spread inside, pressed, dressed and covered with a layer of compost, previously sifted, 4 to 6 inches thick, according to the use to be made of the bed.

Sashes are set in place and then covered with straw mats (Pl. 1, fig. 5) to enable the bed to throw its heat, which usually takes place eight days later. It is only after this time that we can seed or plant, that is to say when the thermometer will register from 70° to 80° Fahrenheit.

Semi-heated beds

Semi-heated beds are made in the same way, but in using manures that have already served. A hotbed can be made into a semi-heated bed. When the hotbed has given all its heat, the compost is removed and fresh manure brought in and mixed to the one already in the bed. These semi-heated beds are very useful for transplanting in April-May.

Cold frame

No manure is required in the making of a cold frame: the sun alone supplies the heat. Seedlings or plants are in cold frames when they are covered by sashes; this is a means to activate the growth. Cold frames are very useful for hardening plants, particularly hotbed plants; this is their last stage before being permanently set in place in the open ground.

It requires the same attention as the other beds hereafter referred to.

Deep bed

This bed is different from the previous ones in this way that instead of being above the ground, the manure supplying the heat is placed into a trench we dig for this purpose. It must be located in a very healthy ground, drained, where rain-waters will not infiltrate, and well exposed to the sun.

These beds are indispensable for the cultivation of melons, cucumbers, squashes and pumpkins, etc. They do not require a large quantity of manure: 1 ft thick will give a sufficient heat to enable plants to grow while awaiting the very hot days that will warm the earth up to the required degree. They may also be used to transplant young plants from the bed.

Heaters

When a bed does not give enough heat, some may be provided with heaters. For this purpose, fresh-horse manure is brought and placed in the paths and around the frames, in place of the one that has lost its heat; it is strongly pressed and some more added until it reaches the level of sashes.

Frames

Frames may vary in size; the one generally adopted is 12 ft long and 6 ft wide; it is 10 to 12 inches high at the front and 18 inches at the rear, thus giving a slope of about 6 inches.

It consequently bears four 6 x 3 ft sashes, the latter having three rows of 10 x 12 inch. glasses.

The frame to be recommended is the demountable frame. When we are through with same, it is taken to pieces and sheltered, which cannot be done with other frames that must be left exposed to the rain and soon become obsolete.

Planting in bed or in seed boxes

Two methods are equally adopted for sowing in bed. First, right in the bed after 4 to 6 inches of compost have been added or again in seed boxes on three inches of compost or sand.

For the first plantings in March, the latter, in boxes, is preferred because at this time it is often very cold and it is difficult, even dangerous to leave the sashes open to plant or transplant into the bed. With boxes, this can be done in the house to the heat and under shelter. One only has to raise the sashes in order to place the boxes on the bed and as this is done very quickly, there is no loss of heat nor any danger of freezing plants.

These boxes can be cheaply constructed with planks from packing crates: ¾ inch thick for the ends and ½ inch thick for sides and bottom are sufficient.

They should all be made alike in shape and size, and this with the view of losing no space in the beds. They should consequently measure 23 inches in length, 13 in width and 3 in depth, for hotbeds measuring 12 x 6 ft, and also be perforated at several places so as to insure a perfect drainage.

The advantages of boxes are the following: the seed germinates better and more evenly; the transplanting operations are done easily and with more facility than in bed; boxes can be moved rapidly and easily when required, on hotbeds or semi-hot beds or on cold frames for hardening.

Looking after the beds

The bed requires careful attention. Forgetting to raise sashes when the sun is hot, would be enough to heat the air they contain to such an extent that all plants would be burned. Sashes must be raised more or less according to the heat existing in the bed. They must be raised on one side only (North) as long as the plants are weak. Moderate waterings must also be given, in the morning only, and with lukewarm water; too much moisture would cause a web-like white mold called "bed rot" which is an injurious cryptogamic mushroom often cutting down all plants that become infested in the beds. It is caused by too much moisture and this is our reason for recommending to water in the morning only.

Shifting

The shifting of all plants to be transplanted is most advantageous. It enables to use all plants that have been sown, which would not be the case if we were obliged to thin them on the spot. It produces dumpy plants well provided with roots. The plant that is not shifted only has a long straight root or tap-root and is a long time before taking root again when transplanting does not cause its death. To the contrary, the shifted plant, after its tap-root has been trimmed away, has grown a bunch of roots to which a small ball of earth is adhering when it is pulled out. It does not feel any injury through transplanting and continues to develop without any loss of time, which considerably increases production.

It is of great importance to shift all plants to be transplanted. This is done, as soon as the first leaves begin to show, 2 inches apart in all directions, the foot completely buried; then a moderate watering is given and plants are covered with sashes, shaded with a light cloth or straw, thus leaving them without air until their retaking. They are given some afterwards and in greater quantity as they are growing up. They must also be dressed and watered as they require. When plants touch, they must be shifted a second time at a greater distance — 4 inches—in the same manner and with similar precautions. We can operate in the same way for all summer vegetables that are transplanted, which may be done in the open ground in a loose soil and well provided with compost. It can previously be hardened by rolling(beating hard) preferably at night, then watered and shaded, taking care not to do so when the weather is hot.

Permanent plantation

All shifted plants set to stay must be planted with their clod. The ground having been duly prepared, manured, harrowed and dressed, drills are traced at the required distance and plants planted in with a trowel. The hole is made with this instrument of the required size and depth and the plant is set in place, filling the space around same with fine earth slightly packed. When the work is over, the plant is watered. As much as possible, this plantation must take place in a cloudy weather or at nightfall. If the heat was excessive, it would be a good idea to cover plants either with a shingle, paper, or a hurdle, etc., until their retaking.

Displanting

Plants must never be pulled out by the stem, because this breaks all radicles and their retaking is delayed. They must be displanted: that is raise them up in driving a tool (trowel) down to a certain depth beneath the plant, bring it down and thus remove from the soil the plant with its ball of earth and all its roots. If the ground was dry, it should be thoroughly moistened a few hours before; otherwise the earth would not adhere to the roots.

Hardening or acclimatization of bed plants

At this time plant stalks are herbaceous; leaves and all their parts are tender, non-lignified and if they were exposed to the air in this condition, right in the sun, a few hours would be enough to kill them. Before setting them permanently in the open ground, we must proceed to their hardening, that is, habituate them gradually to stand the outdoor air and the sun, In this connection, at least fifteen days before being set in place, they are more and more given some air by raising sashes. One will take advantage of a mild night, of a dark day, to remove them completely, and thus the plant will harden; its tissues will lignify and when set in place, preferably when the weather is cloudy or on the eve of a rainfall, it will stand transplanting without being injuried.

This work of hardening plants must be conducted through successive stages and with judgment. As frosts are yet to be feared at this time, it is advisable to take every precaution and to have straw mats on hand to prevent their deadly action.

The cultivation of bed plants requires intelligent and continuous cares, without which success will not be met; but with good will and vigilance good results are obtained.

Preparation of plants

Most of young plants, such as: strawberries, leek, endive, celery, cabbages, etc., will retake more easily if their roots and the end of their leaves are partly removed (Pl. VII, figs 3 and 4). This is also being done when planting young trees: a means of reestablishing the equilibrium between the stem and the roots. In trimming away the extremity of the leaves, the latter are prevented from drawing the pith which remains in the plant, thus aiding it to form new roots more quickly. In cutting away the tap-root, the plant is forced to add ramifying and running roots which will insure its rapid growth.

Straw mats

Straw mats are the best and the most handy coverings for sashes and beds to protect them against frosts. Light and warm, they are moved easily, being rolled up, and are quickly set in place. Any person having beds should have straw mats to cover them. (Pl. 1, fig. 5)

How to make them.—They are made from rye straw roughly woven with heavy twine. Their dimensions are 4 ft wide and 1 ft longer than the length of the sash, so that when in position, they will overlap at both ends. They are made with 4 or 5 warps. They must not be too heavy; their efficiency depends on the care brought in making them up rather then on their thickness.

They will last longer if soaked for two days in a copper sulfate solution at the rate of 10 lbs into 25 gallons of water.

To make them up we can use a frame called "Frame for making straw mats" 5 feet wide and 8 feet long formed of wooden pieces 4 inches square. At both ends in the greater length, are driven 3, 4 or 5 headless nails, the first and the last being 9 inches from the side frames. These nails serve to strain the coarser twine; the smaller being used to sew the straw, after it has been spread, taking in about 15 stalks to each link which are well tightened and made even.

Keeping.—Unroll mats whenever they are wet so that they may dry up, handle them by the warps and not by the straw, keep them in a dry place and safe from rodents. Spreading ashes on them is also a good protection.

CHAPTER IV

MULTIPLICATION OF VEGETABLE PLANTS BY SOWING

Except for tarragon and cives, almost all vegetable plants are reproduced from seed. It is consequently of paramount importance that they all be pure and of good origin if we want to obtain nice products. We shall then get our seeds from consciencious and responsible seedsmen, and not consider the price,—because a small difference of a few cents or dollars may cause the loss of a hundred, if our order is not properly attended to.

Seed growing

Most farmers can raise their own vegetable seeds; if not all of them at least a good part. It is quite easy, in the fall, to select the finest specimens of carrots, beets, parnips, rutabagas, turnips, etc., and keep them in a place where they will not freeze and plant them to stay the following spring. It is yet the safest way to have good seeds. Selected onions set early in the spring will certainly produce seed. Lettuce, endive, radishes sown early will also bear seed. The will to do it is the only condition required.

If seed bearers are planted in a ground that has received a thorough manuring the year before and enriched by the addition of compost, phosphoric acid or potash, high grade seeds well filled and of great vitality will be obtained. The ones that degenerate are those raised on poor soils, and this is just as true for the vegetable kingdom as for the animal kingdom.

To have perfectly pure seeds, we must avoid planting varieties of a same family close one to the other; they must be kept apart as far distant as possible so as to prevent their pollen from mixing. Most of them—and particularly cornsalad and sorrel seeds—require to be collected before completely ripe, and then allowed to dry in the shade. Others, such as salsify and spinach seeds ripen in succession. Those that are turning yellow are collected every day. Beet, carrot, celery, cabbage, onion, leek seeds, etc., are taken into the granary after being tied in bunches and are afterwards thrashed, tagged and sacked.

Some seeds have a very short germination capacity. For instance, salsify, sorrel, parsnip and angelica must be planted the year following their collection. As it is important to know the length of the germinative power of the various vegetable seeds, the reader is requested to occasionally consult the table at the end of this work.

Methods of sowing seeds

As already said, the seeds sown must be be buried more or less deeply, according to their size, and then rolled as described under this heading on page 9.

The germination of seeds may sometimes be hastened by soaking same for 12 hours in lukewarm water before planting. Such action may benefit peas, beans, onions and leeks.

We should also always ascertain the germination value of seeds before sowing, in order to know whether we shall sow thick or thin. For this purpose, a piece of flannel or other cloth is placed in a porous plate, then seeds are counted, put in the wrinkles of the cloth and covered with another plate. If kept in a warm place, these seeds will promptly germinate and after a few days, it will be easy to know the percentage of their germinative power.

1.—*Sowing broadcast.* In a garden where the soil is free from weeds, sowing radishes, lettuce, spinachs, carrots, beets, turnips, onions, etc., broadcast is advantageous.The cultivation only consists in weeding and thinning,which is done by hand. We must not wait until plants have reached their full size to gather them, but remove them as soon as they are grown enough so as to provide more space for those remaining. A greater crop is thus obtained. One must guard against sowing in a compact soil that has not warmed up; we should rather wait until it has. If on the other hand, the earth is too dry, it should be watered the day previous. We must always sow a little thicker than too light, even if we have to thin afterwards.

In sowing broadcast, the plot being dressed, bordered and well levelled, the seed is held into one's hand, kept closed, only allowing for a small opening between two fingers, then the arm is operated like a pendulum giving a zigzag movement to the hand in the direction of the width of the plot. When the seed is very fine, some people mix sand with it; but when one is accustomed to it, all seeds can be sown evenly without taking such an action.

2.—*Sowing in furrows or in drills.* This is the way beans and peas are sown. When the ground is properly loosened, with a forked or weeding hoe (Pl. II fig. 21), having the shape of a lengthened triangle, furrows are traced more or less deep and more or less distant the ones from the others, according to the requirements of the plant sown. The depth may range from 1 to 2½ inches. Seeds are deposited in the bottom of the furrow made in this way and covered, using a rake. If the earth was too compact to be used to cover the seeds, this could be done with other loose earth or compost.

When seeds are fine, furrows are made to a small depth, either with a special marker, either with the back a small steel rake or yet with the end of a dibble (Pl. II fig. 22).

3.—*Sowing in hills.* Sowing in hills differs from sowing in drills only in the way seeds are planted, which, instead of being evenly distributed a certain distance apart in the whole furrow, are sown at intervals, five at a time and in quincunx. It is the best method of sowing to obtain very tender snap beans, as they grow under shelter amidst the clusters thus formed. The picking is also rendered more easy. This sowing not only suits dwarf or pole beans but yet potatoes and corn, etc.

CHAPTER V

WATERINGS

Very often when the young seedlings have not been a success the fault is laid on the seed while the failure should be attributed to the lack of watering. In fact, if dry weather happens to prevail during a few days, at the time a seed is in germination almost at the level of the ground, it does not have the necessary moisture to develop, withers and dies. To avoid this failure we must keep a close attention and water the plant slightly up to the time it has grown enough roots to allow it to take in the soil the moisture it requires. The soil must always be moist.

After weeding young seedlings we must also water. In pulling out weeds, roots of young seedlings may be broken, the plant may even be lifted up; by watering it will be made stronger and new roots will quickly grow that will consolidate it.

All transplanted plants must also be watered; this watering is made abundant by using the neck of the watering can. When planting, a hole is provided close to the plant for this purpose; after watering, the hole is filled up with loose earth which prevents the evaporation and increases the efficiency of the watering.

In dry weather, cabbages, cauliflowers and celery are amongst the plants that need most waterings. Nevertheless, waterings must be made at night preferably so as to prevent the evaporation that would necessarily occur during the day. Abundant waterings are the only ones doing any good; light, surface waterings are rather harmful than useful.

It is recommended to hoe, after watering, so as to loosen the moistened surface and prevent the evaporation.

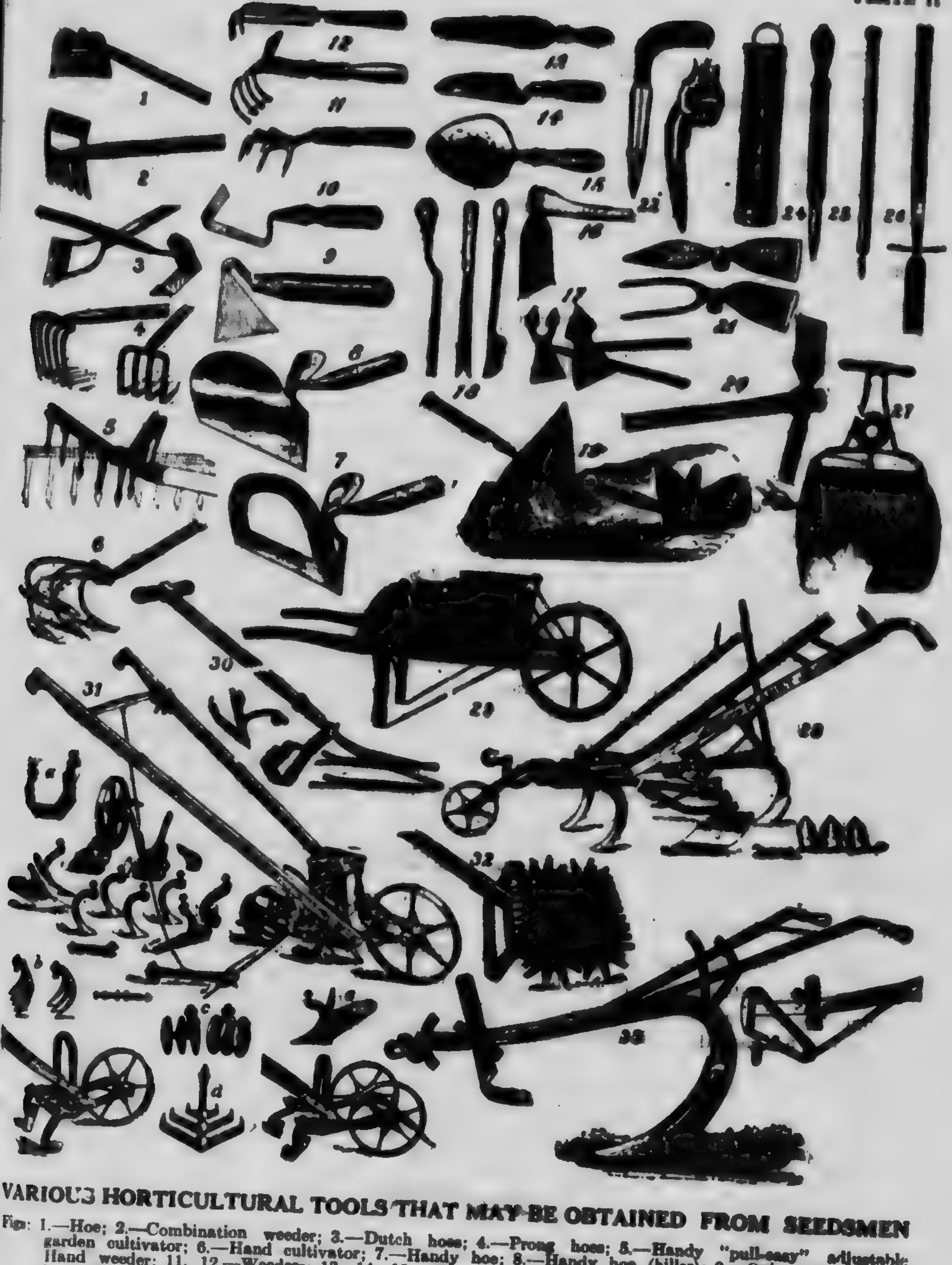
For the same reason, hoeing after a rainfall always does much good; it only needs to be done in due time, when the common saying that: "Hoeing is worth watering" will be true.

A good mulching with manure would have the best result. It is advisable to again state that we can guard against dryness by hoeing to a small depth and very often; but we must not wait until the earth gets too dry, as then it would be too late.

Various installations for watering

Most people wait until the rain is about to fall, to water. Also in dry weather, plants are suffering; their tissues lignify and they

PLATE II



VARIOUS HORTICULTURAL TOOLS THAT MAY BE OBTAINED FROM SEEDSMEN

Figs: 1.—Hoe; 2.—Combination weeder; 3.—Dutch hoes; 4.—Prong hoes; 5.—Handy "pull-easy" adjustable
garden cultivator; 6.—Hand cultivator; 7.—Handy hoe; 8.—Handy hoe (hiller); 9.—Onion weeder; 10.—
Hand weeder; 11, 12.—Weeders; 13, 14, 15.—Trowels; 16.—Mattock; 17-21.—Draw-diamond and forked
hoes; 19.—Marker; 20.—Double hoe; 18.—Asparagus knives; 22.—Dibbles; 24.—Hotbed thermometers;
25, 26.—Weed eradicators; 27.—Roller; 28.—Horse hoe "Planet Jr" No. 8 with cultivator; 29.—Wheel-
barrow; 30.—"Planet Jr" Slide hoe; 31.—No. 25 "Planet Jr" combined hill and drill seeder; a onion harvester
b rakes; c disc hoes; d wheel hoe sweeps; e double mouldboard plow; 32.—"Planet Jr" Pulverizer, level-
er and weeder; 33.—Subsoil plow.

lost all their qualities. In order to have good and tender vegetables, when the rain is lacking, we must be in a position to water them when needed.

Several watering systems have been in use and preconised the best of which to our mind, is still the older, which consists in making use of watering cans "*demoiselles*" as they are called by Parisian gardeners.

Every garden should be laid out in such a way that open water basins should be arranged for, 60 ft. distant one from the other in all directions. These basins are kept full by an aqueduct or by a pump operated by a windmill, a horse or some other power. The gardener takes water from a basin and waters while going towards another basin where his watering-pots are filled anew, and he goes on, quickly making this 60 ft space over which his watering-pots are emptied at the same time, so as to distribute an even amount of water from one end of his course to the other.

This work, however very hard, yet is the one that is best conducted with successful results.

Another process consists in pumping water from a well into a tank installed on a stand high enough to furnish enough pressure to water with a rubber hose equipped with a nozzle. Several market gardeners have this installation which is rather expensive, but which enables to water with chilled off and well aired water, which suits the plants better than the cold shower-bath they receive from a pipe directly adopted to an aqueduct.

Of all the other installations presently in use, the Skinner system seems to be the best, although the cost of its installation is very expensive. As regards sprinklers, large or small, they only are fancy tools with which no serious work can be made and therefore, no good results obtained. The essential in watering is to distribute the water where it is needed and in sufficient quantity. A plant must not be drowned while its neighbour will die from thirst, which is rather common with sprinklers.

The best watering receptacle is the oval-shaped watering-can with roses equipped with coarse and fine wire netting, changed at will, whether we want to water seedlings or plants already strong.

Various trials have been made with other watering-cans of different shapes and nozzles but results have not proven as satisfactory as those obtained with the watering-can equipped with a strainer. It has the inconvenience of getting obstructed but it always makes an even distribution of the water. We were among the first ones to use the Raveneau watering-can, wrongly recommended, because it only had one quality; that of not getting blocked. In other words, an equal watering cannot be effected with this instrument. In fact, the water that does not fall like rain, obeys the sudden leaps caused through walking and is poured irregularly, often leaving some parts unwatered. We would recommend its use for thick liquid manures only.

Water to be used in watering

We very seldom have the opportunity of selecting the quality of the water to use. Whenever possible, however, preference will first be given to rain-water, which is the best of all, then to stream waters or those that are well aired and free from lime.

CHAPTER VI

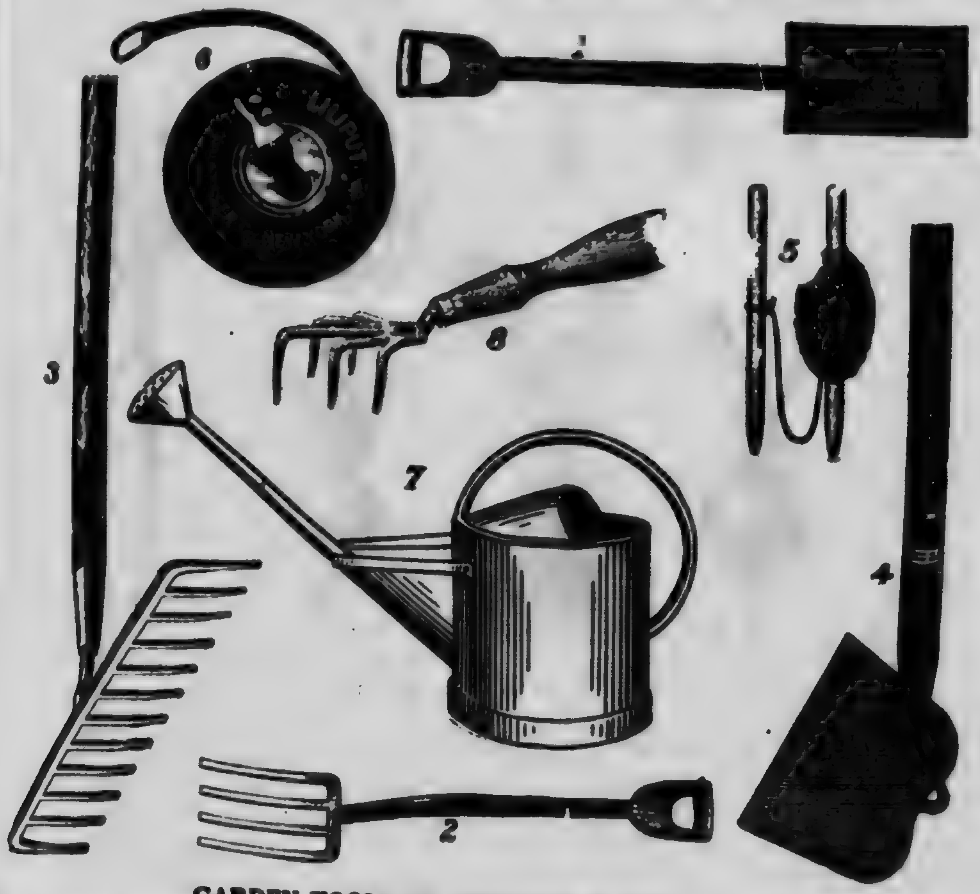
THE SECRETS OF SUCCESS IN VEGETABLE GARDENING

In order to meet with success in this culture, we must first like the plants, take interest in them, feed, water, clean and give them a thousand other cares just as would be the case for a new-born child. A plant is a living being which is set in the ground and cannot move alone to get its food: its access must be made easy.

It will then be given a loose and permeable soil, and well manured. As soon as it has grown up, all noxious weeds that would choke it will be pulled out. As the pulling out of these injurious plants growing nearby cannot be operated without breaking some of the roots, or lifting the plant; it shall consequently be watered so as to strengthen and provide it with a proper amount of surface manure constituting food and enabling it to promptly grow new roots; after that, it will be in a better position to struggle for its life.

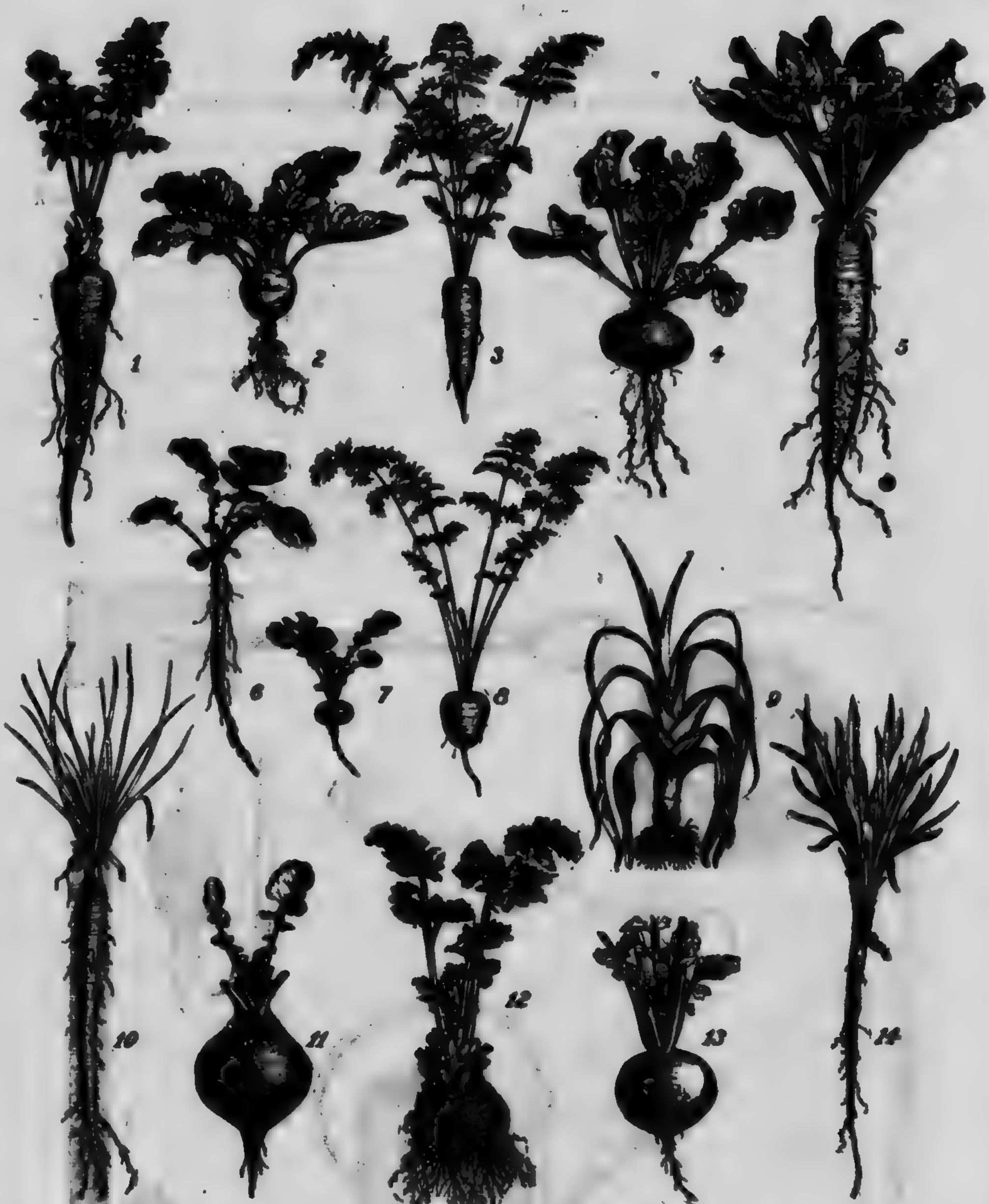
Never allow the earth to crack, to harden above the roots; it should be kept properly loosened by repeated hoeings. A good mulching, waterings if dry weather comes on, will enable the plant to develop quickly and without any loss of time, and if insect pests and diseases show up, nothing will be left undone to control and get rid of same.

Here lies the secret of successful vegetable gardening: it is now up to you to try and make your profit of it.



GARDEN TOOLS OF ABSOLUTE NECESSITY

Figs: 1.—Spade; 2.—Digging fork; 3.—Steel rake; 4.— Hoe; 5.— Cord; 6.—Measuring tape; 7.—Watering can; 8.—Weeder.



Figs: 1.—Parsnip; 2.—Kohlrabi; 3.—Carrot, long; 8.—Short; 4.—Beet, round; 5.—Long; 6.—Radish, long; 7.—Short; 9.—Leek; 10.—Salsify; 11.—Swede turnip; 12.—Celeriac; 13.—Turnip; 14.—Scorzonera.

PART II

SPECIAL CULTURES

CHAPTER I

CLASSIFICATIONS

Horticulturists divide vegetables into four categories, according to their nature as regards feeding:

1.—**Root** or **tuberous** vegetables: carrots, beets, etc.,

2.—**Herbaceous** vegetables: cabbages, asparagus, lettuce, etc.

3.—**Fruit** vegetables: beans, tomatoes, melons, peas, etc.

4.—**Condiment** vegetables, used to improve the taste of meats, dishes: French thyme, savory, parsley, chervil, etc.

We will make this classification our own, describing the cultural attention required by each crop.

Mr. Desjardins-Beaumetz in his work, "L'Hygiène Alimentaire" has also classed them, but according to their food value, in the following way:

1.—**Feculent vegetables**: beans, broad beans, peas, potatoes;

2.—**Azoted vegetables**: cabbage, asparagus, mushroom;

3.—**Mucilaginous** and **Saline vegetables**: lettuce, endive, spinach;

4.—**Acid vegetables**: sorrel, tomato.

CHAPTER II

ROOT OR TUBEROUS VEGETABLES

POTATO (Chile)

Salanum tuberosum L.;French: *Pomme de terre.*

This plant belonging to the family of the Solanaceae, and which is so beneficial to our diet, fears hot countries as much as excessively cold climates. It thrives in all healthy and well-drained soils, neither too dry nor too damp, but preferably in clay and sandy-clay soils, rich in organic matters, phosphoric acid and potash. It consequently requires loose earth, broken up deep to store under roots the moisture necessary to feed the plant in dry weather, also repeated hoeings to prevent its avaporation, which is indispensable to have a good crop.

Manure

The potato plant needs a large quantity of food. A good formula for manuring is the following:

10 tons of good rotten manure.
500 lbs of superphosphate at 15%.
150 " " chloride of potassium or 1000 lbs of ashes.
250 " " nitrate of soda or columbine as a covering.

Cultural requirements

Plowing and breaking up operations being executed preferably in the fall, manure and fertilisers are spread in the spring as soon as the earth has warmed up, they are afterwards closely incorporated by a light plowing at first, then by successive harrowings. The soil must afterwards be kept well clean up to the time of planting.

Planting

Plant as soon as frosts are no longer to be feared, 2½ ft. between rows, for early summer varieties, and 3 ft. for autumn varieties, 12 to 18 inches apart in the row and to a depth ranging from 2 to 5 inches, if the soil is heavy or light, moist or dry. Only plant healthy seeds. If necessary, seeds should be disinfected in a formalin solution at 1-200 (1 pint of formalin into 200 of water).

Hoeing, weeding, earthing up

Cultivation consists in hoeing frequently to destroy noxious weeds and prevent the evaporation. Plants should be earthed up as soon as sufficiently grown up, the operation being repeated several times, if necessary.

Diseases

To grow potatoes and neglect to take means to prevent diseases in infested districts, is a loss of both time and money.

We control them by spraying with Bordeaux mixture, as described in chapter under the title of "Insecticides",

Harvesting

Potatoes should be harvested when the leaves are completely dry or have turned yellow. It is advisable to let them warm up in the sun before storing them.

In the garden, we do not wait until they are perfectly ripe to dig them out. This is done as they are growing in size, by searching with the hand, at the foot of the plant, but without pulling it out, only removing the tubers that are the biggest in size. In this way, we can consume potatoes at an early date without destroying the plant which will continue to grow.

Varieties. — The most recommendable varieties are the following:

Early: Early Rose, Irish Cobbler, Eureka extra early.

Late Carman No. 1, Green Mountain Vermont, Gold Coin, Dakota Red.

Storing. — In winter time, potatoes should be stored in a cool and dry place, unlighted and where they will not freeze, the temperature ranging between 33° and 35° Far. We must also guard against piling them up in heaps too thick.

CARROT (Europe)

Daucus Carota L.; French: *Carotte*.

The carrot ranks second amongst cultivated vegetables. after the potato. It constitutes a very healthy food. It is used in soup, stew, sauce, fried, etc., and is recommended by all doctors.

Alike all root crops, it requires a light, loose, deep and fertile soil. Being an exhausting plant, it demands compost-like, well-rotted manures. In rotation it must come next to a crop abundantly manured the year before. It is advisable to remember that fresh manure ramifies and hardens its roots, we must therefore avoid using it.

Varieties: — Early varieties for hotbed cultivation: *Earliest Short Horn* carrot, *Dutch Horn* or *Early Scarlet Horn.*

Second early for open ground cultivation: *Danvers, Nantes, Chantenay,* half long.

Late: *St. Valery.*

Cultural requirements

The soil being well prepared, loosened, and fertilisers buried, it is levelled and rows are traced at various distances according to the mode of cultivation. For beds, 4 rows, one inch deep, will be traced 2½ ft. apart. When the ground is well suited, the May-June sowing may be made broadcast. Then we must sow very thin, not more than ½ inch deep and roll. Radishes may also be sown at the same time, very thin, They will be picked before they interfere with the carrot which takes more time to come out. If plants are too thick, thin 1 or 2 inches apart. The largest ones are pulled out while thinning. Frequent hoeings and hand weedings, in the row, are necessary. In dry weather, mulch if possible, water or hoe frequently.

PARSNIP (Europe)

Pastinaca sativa L.; French: *Panais.*

Same requirements as the carrot: 3 rows to a bed or in drills 2 ft. distant, thinned 3 to 4 inches apart. Seeds may be sown from May to the end of June; the latter to be eaten in the spring, at which time they are pulled out, when needed. As the parsnip plant does not freeze, it may remain in the ground all winter.

Use

It is indispensable to make soup. It is also consumed with meat juice or in white sauce.

CELERIAC (Europe)

Apium graveolens L.; French: *Céleri-rave.*

This celery, with all the qualities and the taste of ribbed-celery, is wrongly given too little attention in so far as its growing is concerned. Better than the other, it has the property of keeping until springtime, that is for a long period when ribbed-celery cannot be found.

Use

Celeriac is seasoned with white sauce or meat juice. It is equally served with roasted meats. It may also be made into salad or soup.

Cultural requirements

All celery plants, including celeriac, thrive in cool, light or sandy soils, rich in organic matters, deeply loosened, in well rotted-manures added with fertilizers. Celery plants are not sown to stay; sowing in beds must take place around March 15th, for the earliest, and then on to the end of April. Shifted plants are set to stay by the end of May or beginning of June, in seed-beds 18 to 24 inches distant and 8 to 10 inches apart between the plants.

Celery plants are thirsty for water. As they fear dryness, all means must be resorted to in order to prevent same; plenty waterings, frequent hoeings, mulching.

Before planting, the end of roots and the top of leaves are slightly cut off and, during summer, we often do with the lower leaves which turn yellow and lay on the ground.

Towards the end of August, plants are slightly laid bare and the interfering roots cut away. Hilling takes place about one month after so as to favor the enlarging of the root.

The crop is harvested in November and kept in sand.

Varieties:—The best varieties are: *Paris Improved, Erfurt,* which is very early, and *Large smooth Prague.*

ONION (Asia)

Allium Cepa, L.; French: *Oignon.*

Use

The onion is of daily use in the kitchen; one would hardly do without it. It is pickled like gherkins. In certain countries, sweet flavored onions are consumed uncooked. It is a very healthy food.

Cultural requirements

The onion thrives in a healthy and cool soil, well provided with rotted manure or pulverized compost and prepared one year in advance, at least. It does not like fresh manures, hard, cold and damp soils. Plants are eager for phosphoric acid and potash. It is usually planted in a soil abundantly manured the year before, added with 500 lbs of superphosphate, 200 lbs of chloride of potassium and 300 lbs of nitrate of soda to the acre, then interspread on top in three operations.

Onions may be grown in three different ways:

1.—By sowing in hotbeds or seed boxes, from March 1st to 30th. Plants thus obtained are transplanted to the open ground, as soon as it has sufficiently warmed up, 2 inches deep and 4 inches apart in rows 14 inches distant.

2.—By very thick sowing in the ground, in the spring, in view of obtaining small bulbs about the size of a nut, which will again be planted very early the following spring.

3.—By direct sowing made at an early date in the spring, as soon as the earth has thawed. Onions obtained in this way will ripen about two months after the others, but will keep better through the winter.

Onion seed must be planted ¼ or ½ inch deep at the most. If the work is done by hand over a small area, onions might be grown on beds of 6 rows, 6 inches apart and 2 to 4 inches distant in the rows. If hoe cultivation is to be given, rows should be from 12 to 14 inches distant.

Cultural requirements consist in frequent hoeings, as soon as 2 to 3 inches high, so as to retain moisture, in thinning when necessary and removing noxious weeds as often as found advisable.

When we find that onions are running to seed, the only thing to do is to cut away the stalk growing in the center as soon as it shows; the topped onion will not lose anything in appearance.

Onions must be harvested as soon as stalks grow yellow. In fact, the fading of stalks indicates ripeness, which may be hastened in laying them down and in rolling them over. They will keep better if allowed to dry in the sun for one week, after which they are topped and packed in onion crates (Pl. VIII fig. 7), so as to always be perfectly aired. We must avoid putting them in bags or in heaps. That is all for onions from seed.

Those planted should be marketed for summer consumption; they will command higher prices.

Varieties to be recommended:—*Danvers Yellow Globe, Straw-coloured white Spanish onion Silver King* (white), *White Queen, Pale Red Niort, Dark Red Madeira.*

Pickling onions: *Barletta.*

Onions for transplanting: *Red Wethersfield, Prizetaker.*

LEEK (Southern France)

Allium porrum, L.; French: *Poireau.*

Use

The leek is of daily use and indispensable in the preparation of soups, juices and white sauce. It is also eaten in vinegar sauce, like the asparagus, after being grilled. It is refreshing, healthy and much appreciated.

Cultural requirements

The leek must be sown in beds around March 15th, shifted preferably, and set to stay in May, in plots of 6 rows, the latter 6 inches apart. When planting, ends of leaves and roots will be trimmed away. We must afterwards water, hoe, weed and repeat these operations as often as necessary to keep the soil moist and destroy weeds.

The leek must be given the same tillage as the onion with this difference, however, that it must be banked with earth in order to effect the blanching on a greater height.

Varieties:—*Large Rouen, Monstruous Carenlan.*

TURNIP (Northern Europe)

Brassica napus, L.; French: *Navet.*

We cannot do without the white turnip in the kitchen; sliced thin and arranged in layers with cheese, sprinkled with flour and added with juice and set to brown in the oven, it makes a delicious dish. Duck meat prepared [illegible] turnips is also delicious. Milk soup with turnips and potatoes is both very pleasant to taste and nourishing.

Cultural requirements

The turnip is very easy to grow and comes everywhere. It thrives best in limy soils. It must not suffer at all if it is desired to be tender and sweet. It must accordingly receive an abundant manuring, and water when needed. Sow from May to July in very loose soil, hardly burying the seed, slightly beating with a fork and rolling.

Once seedlings are out, thin 4 inches apart, and hoe so as to keep the surface loose and free from weeds.

Varieties:—*Milan Purple Top*; early, round, *Vertus half-long, Early White Flat, Snowball,* and for winter use, *the Black Alsacian Turnip.*

RADISH

Raphanus sativus, L.; French: *Radis.*

Use

It is consumed with salt as a side-dish or in salad with its leaves.

Cultural requirements

Its cultivation is one of the easiest. It must only be sown with other crops; acting otherwise would be losing ground. It does not interfere with other crops as it grows quickly and reaches full development before troubling them.

They may be harvested during a good part of the year, first in beds and then in the field as a catch crop.

The seed is placed ½ inch deep with a fork or rake, either before lettuce, endives, or other plants are shifted or again between tomato, onion, cabbage plants, etc. Sowing must be repeated every 15 days if a whole summer supply is desired.

Varieties:— Early, *Early Round Scarlet, Round White Tip, Half-long Scarlet, French Breakfast, Icide, Rosy Gem.*

Late.—*Vienna Long White, Long Black Spanish.*

KOHLRABI

Brassica gongilodes, L.; French: *Chou-rave.*

AND

SWEDE TURNIP

Brassica oleracea, L.; French: *Chou-navet* (chou-de-Siam).

Use

Are consumed cooked in gravy with roasted meat. These two very much distinct kinds are often mixed. In the kohlrabi, the swollen stem is the edible part whereas the root only of the swede turnip is consumed.

The kohlrabi is sown at the end of April in semi-hot bed and permanently transplanted in May-June; 3 rows to a plot, 1¾ ft apart and 8 inches between plants. Some may be gathered three months after permanent plantation. They are better when young, before they reach full size.

Swede turnips are planted in the open, ½ inch deep in drills 18 to 30 inches distant. They are later on thinned, leaving 8 inches between plants. They require cool, deep and fertile ground, as well as necessary hoeing and cleaning attention. Turnips are more tender and juicy if sown a little later.

Varieties:—*Early Vienna Kohlrabi, White Fleshed Turnip, White Turnip, Rutabaga, Champion, Purple Top.*

SALSIFY (Spain)

Tragopogon porifolius, L.; French: *Salsifis.*

AND

SCORZONERA

Scorzonera hispanica, L.; French: *Scorsonère.*

Use

Young shoots are made in salad; root in stew, white sauce, or fried in its original state or soaked in a light paste. It is a delicate and palatable vegetable.

Cultural requirements

Very easy, it however needs a light soil, loose and deep to enable its long roots to penetrate without forking, which happens in compact and stony grounds.

Sowing in plots takes place in April-May, in 4 rows 12 to 18 inches apart, ½ inch deep; thin to 3 or 5 inches if too thick and give frequent hoeings. Tillage is the same as for parsnips and carrots; it does not freeze. It may also be sown in summer for consumption the year following.

Varieties: *Sandwich Island.*

BEET

Beta vulgaris, L.; French: *Betterave potagère.*

Use

The beet is very healthy and refreshing. It is consumed in salad after being cooked in water or in the oven.

Cultural requirements

It is successfully grown on any loose soil properly broken up, drained and plenteously manured the year before. It fears fresh manures and needs a little surface manuring after its coming out so as to hasten its growth. Sow in May, ½ inch deep, in rows 16 to 24 inches distant. Radishes may be grown between the rows. Thin to 4 or 6 inches and hoe frequently.

Varieties:—*Eclipse Round Red, Egyptian Black Flat, Detroit Dark Red, Early Model.*

JERUSALEM ARTICHOKE (North America).

Heliantus tuberosus, L.; French: *Topinambour.*

This plant thrives in any soil, even the poorest. It is consumed like potatoes, but is more aqueous, having much the taste of the artichoke. When distilled, it is marketed under the shape of burning alcohol.

These tubers are planted whole or in sets with 3 eyes or germs, in the spring, April-May, leaving 3 ft between the rows and 15 or 18 inches between the sets. Cultural attention consists in hoeings to keep the soil clean and loose.

The *common* variety is the one most generally grown; it should make place to the potato Jerusalem artichoke which is highly superior in quality and yield. This variety has been obtained by Mr. Vilmorin.

CHAPTER III

LEAF OR HERBACEOUS VEGETABLES

ASPARAGUS

Asparagus officinalis, L.; French: *Asperge.*

The asparagus was known and cultivated twenty centuries ago. The Greeks, long before Jesus Christ, used to consider it as a dainty and the Romans, as related by Pline, had a kind of a passion for this plant.

Being as great appraisers of its qualities, we also, believe this legume to be the best of all. This is why we would like to see it grown in every garden and served on every table, so that everybody may enjoy eating it.

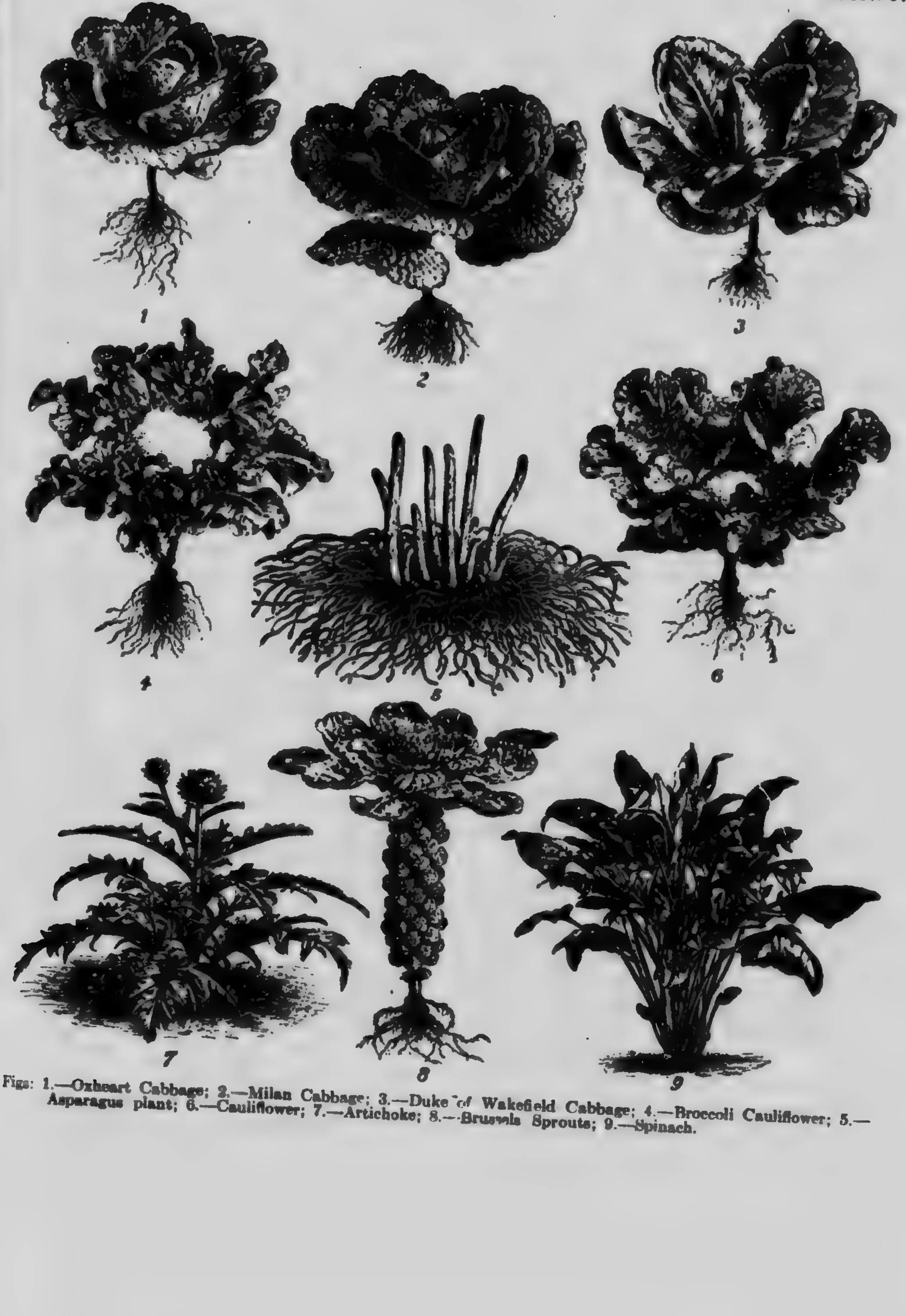
Use

Asparagus shoots are consumed when boiled in salt water for a few minutes, with vinegar sauce or white sauce. Asparagus tips, stewed in butter, with eggs, make a delicious omelet. It is used in medicine, in remedies; it is often prescribed by physicians as diuretic and sedative of the heart. The seed itself, once distilled, produces very pure alcohol and makes an excellent table liquor.

Cultural requirements

The asparagus grows better in sandy soil, a little clayey and rich in organic matters, resting on a very permeable subsoil. Its roots being plump and spongy, it fears stagnant humidity which would cause it to rot. It is propagated by sowing its seeds broadcast in plots or still better in rows 1½ ft apart, in the early days of spring and in a sandy,

PLATE IV



Figs: 1.—Oxheart Cabbage; 2.—Milan Cabbage; 3.—Duke of Wakefield Cabbage; 4.—Broccoli Cauliflower; 5.—Asparagus plant; 6.—Cauliflower; 7.—Artichoke; 8.—Brussels Sprouts; 9.—Spinach.

loose soil properly manured with compost, if possible. Seedlings appear three weeks later, they are thinned if necessary and hoed and weeded several times in order to maintain the soil loose and clean. Thus is obtained the plant for permanent plantation. One year could be gained by purchasing same. One-year plants are the best.

Permanent plantation

A good plowing will first be made in the fall, then the subsoil will be broken up with a digging plow, or yet we can proceed as indicated under the heading "breaking up."

Planting takes place in the spring as soon as the earth is dry and warm enough.

Before proceeding to planting, the land will be plenteously manured with well-rotted manure, at the rate of 20 to 40 tons per acre, which manure will be plowed in and then harrowed. Small trenches, 8 to 10 inches deep shall then be dug along a stretched cord, 4 ft apart, with a plow or a shovel. Then, after driving in at every other foot along the rows stakes showing the spot to be occupied by each asparagus plant, small heaps of compost, 5 inches high, will be deposited therein. Stalks from seed will then be pulled out carefully with a toothed fork, so as not to bruise their roots, and carried to the planting ground where each one of them will be placed on one of the compost hills. The roots of the stalk, once properly spread all around the circular hill, will be covered by 2 inches of compost which is made to penetrate into all interstices, and pressed so that no space will be left empty, then a convenient mulch will be added to finish the work. Later on, during the summer, frequent hoeings and weedings will keep the soil clear of weeds and the surface well loose. So as to utilize the space between the rows, beans, lettuce, radishes, turnips, etc., could be sown providing they are far enough from the asparagus plant not to shade same and thus interfere with its development.

In the fall, asparagus stalks that have turned yellow are cut away, 3 inches from the ground and burnt, and well consumed manure or compost is spread all around, being careful, however not to put any on the crown, which would cause it to rot.

The following spring, the stumps of stalks which mark the place of asparagus are puled out, and the manure applied the autumn precedent is hoed into the ground with a flat-toothed fork, being careful, however, not to touch the roots. Cultural requirements throughout the summer are the same as for the previous year: hoeings, weedings and mulching.

The third year, the same operations are repeated and more manure applied, that is 20 tons of good manure to the acre, deeply plowed into the shelving-beds in view of facilitating hilling up. If the ground is rich with humus, an application of 300 lbs of superphosphate, 100 lbs of sulfate of ammonia and 200 lbs of nitrate of potash together with 200 lbs of nitrate of soda spread on top, will replace manure advantageously.

These manurings, repeated each year, will increase the crops considerably. After the third year, the asparagus-ground will be established. We will then only have to hill up the plants, covering them by 10 to 12 inches of earth and to gather, 15 or 20 days later, the suckers of required size that will come out. The picking is made by hand or with a special knife called asparagus knife (Pl. 11 fig. 18).

Asparagus to be marketed must be tied in 2 dozen bunches with an asparagus buncher (Pl. VIII, figs 1 and 2). When intended for shipping to some distance, bunches are packed in boxes having a capacity of 2 dozens (Pl. VIII, fig. 3).

When the picking is over, asparagus stalks are provided with poles to prevent their breaking.

Varieties : — The *Early Purple Argenteuil* asparagus is the best in all respects, and the most usually grown. It needs earthing up.

The *Palmetto*, much in vogue throughout the United States, is a green asparagus so that it does not require earthing up.

CABBAGE (Asia and Europe)

Brassica oleracea, L.; French: *Chou*.

Use

It is the most popular vegetable particularly in the country. In Northern Europe, it constitutes the base of nourishment, in the shape of sour-krout. It is served on the richman's table as well as on that of the poor, cooked with meat or lean. Cabbage soup which is made in the pot,—as the song says—is always accompanied by a piece of lard, put to simmer with a pigeon, a part of a goose or still, what is better, with a partridge. The cabbage makes a relishable dish with sausage. This food is healthy and highly restorative for strong stomachs.

Cultural requirements

Cabbages belong to a prolific tribe; some are to be found of all shapes and in all seasons. In mild countries they are gathered during the twelve months of the year. This cannot be done, under our climate, but nevertheless it is possible to hasten their growth with beds, and those sown on March 15th may be consumed in the latter part of June. Successive sowings will furnish cabbages for the remaining of the summer, the autumn and winter. They are grown easily. First sown in nursery, then shifted, they are set to stay in a well loosened ground, properly prepared and heavily manured. Early or summer varieties shall be planted in warm and light soils; fall and winter or late varieties, in heavier grounds.

Plant those from beds in the early days of May, 14 inches apart in rows 24 inches distant.

Fall and winter cabbages will be sown in cold frames around the latter part of April, shifted three weeks later and transplanted permanently by the middle of June 20 inches apart in rows 24 inches distant.

As soon as planted, water with the neck of the watering pot, then hoe and repeat this work frequently. Watering with liquid manure diluted in 4 times its bulk of water or in adding nitrate of soda or poultry manure, will hasten the vegetation to a considerable extent and will largely increase the yield. In fact, the cabbage particularly needs azote and potash fertilizers. We should not then fear manuring copiously.

Cabbages may be kept "heeled-in" during the winter and well protected by a thick layer of dry leaves or again in a dry, cool and well-ventilated place. Cabbage heads that are thoroughly dry when stored in are placed on lattice shelves so as to allow the air to circulate freely between them.

Summer varieties[1] — *Early Etampes, Express, Large Early Oxheart, Copenhagen Market, Erfurt Wakefield, Henderson's Early Summer.*

Autumn varieties:—*St. Denis, Winnigstadt, Boston.*

Winter varieties:—*Norwegian Savoy, Vaugirard, Cannon Ball, Brunswick, Dark Red cabbage*, to pickle in vinegar.

Brussels Sprouts are cultivated like autumn cabbages; are sown around the end of April.

CAULIFLOWER

Brassica oleracea Botrytis, D.C.; French: *Chou-fleur*.

Use

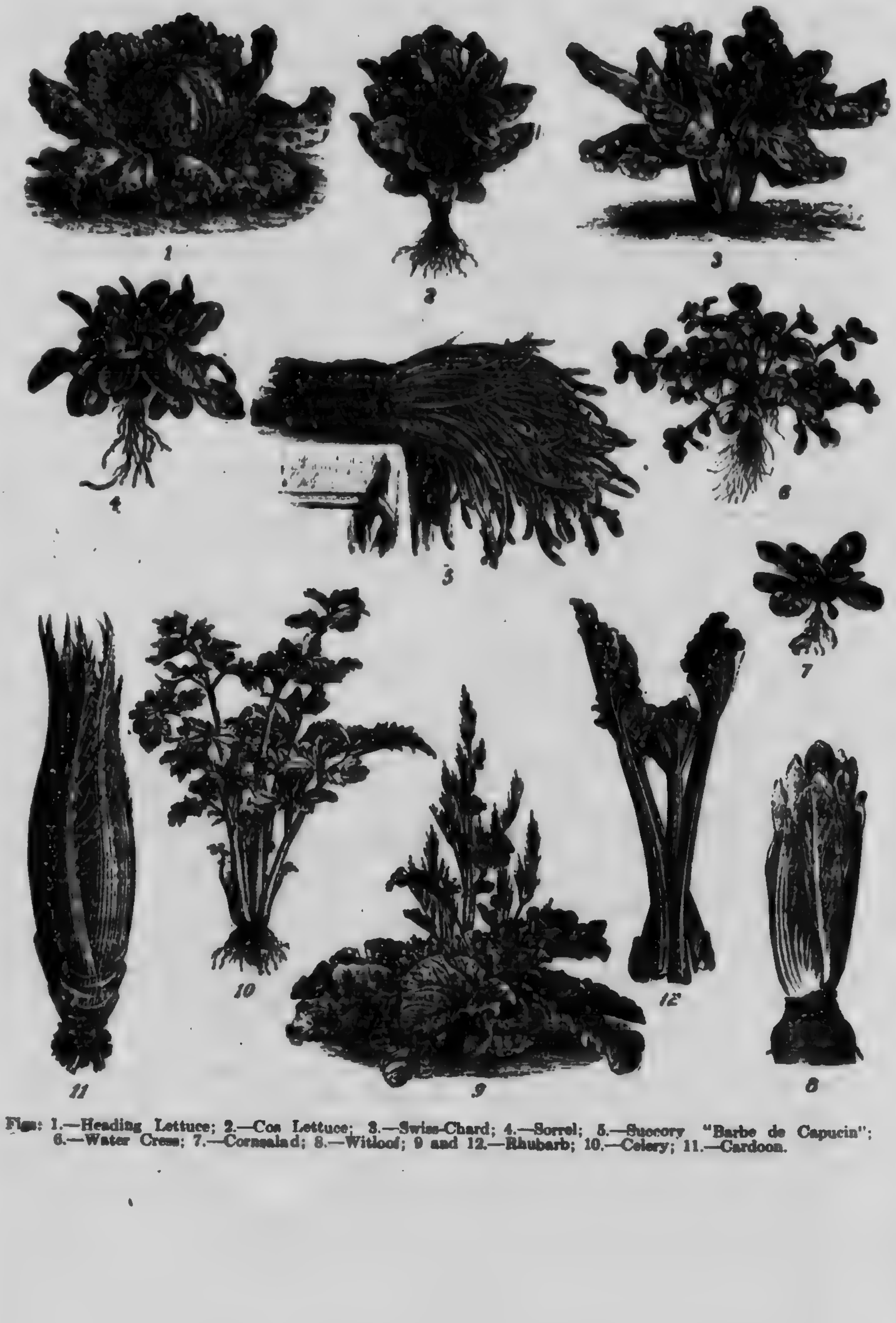
Is consumed with white sauce or cooked in butter; it is also pickled like gherkins.

Cultural requirements

The cauliflower thrives in a cool soil and under a damp climate; fears dry and barren grounds and drought. In order to succeed, it must grow quickly and without stop; if not the head will be small, badly formed and the crop almost nil. It consequently requires rich soil deeply broken up, heavily provided with prompt and energetic manures.

The first early cauliflowers are sown in hot beds around March 15th, shifted and then set to stay by the end of May, the same distances between the rows and between the plants being observed. Autumn plants, sown the latter part of April, are shifted and transplanted to stay in June. They all need special attention: watering with manure, with liquid

PLATE V



Figs: 1.—Heading Lettuce; 2.—Cos Lettuce; 3.—Swiss-Chard; 4.—Sorrel; 5.—Succory "Barbe de Capucin"; 6.—Water Cress; 7.—Cornsalad; 8.—Witloof; 9 and 12.—Rhubarb; 10.—Celery; 11.—Cardoon.

manure or poultry excrements; frequent hoeings, mulching and, in case of drought, abundant waterings.

As soon as the head appears, leaves may be tied over same to keep it in the dark and allow it to remain white, or again one may break a few leaves and place them on the head for the same purpose.

Early varieties:—*Dwarf Extra Early, Snowball, Erfurt, All Seasons Marvel, Half Early Paris, Large Late Le Normand, Danish Giant, Incomparable.*

BROCCOLI

Brassica oleracea botrytis, D.C.; French: *Chou Brocoli.*

Use

The same as for cauliflower.

Cultural requirements

Broccoli cabbages demand rich, light and healthy soil; cold, compact and damp grounds are injurious to them. They stand severe colds. What they fear particularly are the successive frosts and thaws which cause them to die.

Planting cabbages in rows deep enough will protect them against these inconveniences. The foot of the plant is earthed up to the first leaves, and when the colds grow severe they are covered with dry leaves and manure containing straw besides.

These leaves and manures are removed only when frosts are no longer to fear. A good manure is spread on top and turned in by a good hoeing, this operation being repeated several times during their vegetation.

When the head begins to form and the weather is dry, abundant waterings are imperative. In order to have neat white heads, cut leaves down over them so as to stop the rays of the sun.

Sowing is made at the end of June; the plant is shifted in mid-shadow three weeks to one month later to be finally transplanted in August.

Cutworms

This grub often works damage, particularly in the spring. It may be pretty well controlled with the following remedy: moisten, with water sweetened with molasses, 50 lbs of bran on which 1 pound of Paris green is sprinkled. Smaller quantities may be prepared in the same proportion.

Spread at night near cabbages. At night grubs will eat this bran mash and will be poisoned.

Varieties:—*Extra Early White, Half White Extra Early, Easter Day, Large White Mammoth.*

WATER CRESS

Nasturtium officinale, R.B.; French: *Cresson de fontaine.*

Use

Cress is an antiscorbutic; it is eaten uncooked, in salad, or chopped and cooked like the spinach. In France it always accompanies beefsteak which is served surrounded with cress.

Cultural requirements

Its favorite place is in a ditch the bottom of which has been well prepared, loosened and plenteously manured and on which flows clear limeless water.

There are two methods of establishing a cress-bed; from seed or in planting young cuttings.

Sowing

The bottom of the ditch being prepared as above described, the stream having previously been turned away temporarily, the seed is sown broadcast. The soil is kept moist to promote germination, then the water may be gradually let on as it grows. Harvest may take place about 1 month and a half after sowing.

Cuttings

Cress cuttings are transplanted in the ditch prepared for the purpose, and it is allowed to become full of water as in the former case when plants have reached full development. Then, the gathering begins. The cultural attention consists in preventing the development of foreign aquatic plants and to pick up the duckweed.

ARTICHOKE

Cynara scolymus, L.; French: *Artichaut*.

Use

White petioles may be eaten as cardoons. The fruit, cooked or in the raw state with vinegar sauce is delicious.

Cultural requirements

The artichoke must be sown in February, in green-house or in hot bed, in pots, then re-potted and set in place in the latter part of May. It requires rich soil, properly broken up, liquid manurings and frequent hoeings to promote its growth. Harvested in August.

We were able to make them stay in the ground through the winter after being earthed up, covered with wheat chaff and dry leaves, the plant surrounded by rye-straw.

These two year old plants will yield an earlier and more abundant crop the next year. Remove offsets, only leaving the three that look finer.

Varieties: — *Large Globe* or *Paris*, *Flat of Britany*.

CARDOON (Mediterranean Basin)

Cynara cardunculus, L.; French: *Cardon*.

Use

Leaf stems, after blanching in a similar way as those of celery, are cooked in water added with vinegar, which removes bitterness, and are afterwards prepared in white sauce or served with roasted meats, or again slowly cooked in the oven with cheese. In any way, it makes a delicious dish.

Cultural requirements

Sow seeds in pots in hot beds around March 15th, thin plants, leaving 3 only. Open a ditch 1½ ft wide and as much deep, put 1 ft of good manure and cover with the earth from the trench. Towards the end of May, plant cardoons, 3 ft apart. Water, hoe and mulch when needed.

When rows are 4 ft apart, they may be used to sow spinachs, radishes or lettuce.

Blanching starts in October. For so doing leaves are raised with a straw rope and tied not too tight. Plants are afterwards covered around with long straw firmly held by several bands and the foot well earthed up.

As they fear frosts, when they are imminent, plants must be pulled out and "heeled in," covered with leaves or again stored in a dark cellar.

Varieties: — *Tours Cardoon*, *Spanish Cardoon*.

LETTUCE

Factuca capitata, D.C.; French: *Laitue*.

Use

Is of daily use and is found every day on all tables throughout Europe. It is consumed cooked with meat or with green peas in white sauce; but it is particularly consumed in enormous quantities in salads with oil and vinegar or with cream.

Cultural requirements

Lettuce comes well in all soils that have been manured the year before. It may be sown in nursery and transplanted at intervals or directly where it is to stay and thinned. It grows finer when transplanted. Sow in beds in April and successively in the open ground up to July.

Plant 4 or 6 inches apart in beds of 6 rows, 12 inches distant, hoe, weed, mulch and water when necessary.

Varieties: — *Grand Rapids*, *Unrivalled*, *Four Seasons*, *Marvel*, *Cos-lettuce*, *Large green*, *Nonpareille*, *Big Boston*.

ENDIVE (Europe and Asia)

Chicorium Endivia, L.; French: *Chicorée*.

Use

When blanched, endive is used to make

salad. It is equally consumed cooked with fat; it is excellent with any meat, particularly lamb and pork, also in white sauce with milk or butter.

Cultural requirements

Endive thrives in rich and cool soils; it is grown in dry grounds only when the latter are abundantly watered.

Sowing in the open ground is made in June, to a proper exposure. Thin if too thick and plant to stay when strong enough. They are pulled out, after the soil has been well moistened, and the end of the leaves and roots is trimmed away before planting in well plowed up, loosened and manured ground, 6 rows to a bed, or 6 inches apart in all directions.

A good method consists in mulching the bed before planting; this will supply coolness throughout the summer and will insure success. Cultural attentions consist in frequent hoeings and plenteous waterings, when required.

Plants are blanched as soon as they have reached full growth. We may operate as we are in need of them and beginning with the largest. This is done by tying them either with straw, cord or raffia; holding the rope between the left hand fingers, the two hands are used to gather up the leaves of the endive and tie them.

If a certain quantity requires blanching at one time, the quickest way consists in covering the plants with straw mats; air and light being excluded they will blanch perfectly; another method consists in pulling them out and in planting them in the cellar, side by side and thick. This is the process followed when they are all stored in for fear of frosts. Whatever may be the processing, it is essential to start blanching when the plants are absolutely dry only; otherwise they would rot.

Varieties—*Early, Italian Curled, Late Rouen Curled, Louviers Fine laciniated, Green fine curled.*

CHICOREE DE BRUXELLES (Witloof).

Use

Is used in salad or cooked with gravy.

It is cultivated in the same manner as the precedent except that it is not shifted. It is sown in June and thinned to 10 inches, proper tillage being made with a view to obtain a large root. In the fall, roots are carefully pulled out, the leaves cut away, stored in a cool place where freezing will not be feared, then put to force in a deep bed loaded with sand or compost. Roots are buried in erect, side by side, up to the collar and watered. When frames are in place, dry leaves or moss are used to cover the plantation. Sashes are also covered to exclude the light. The bed must give from 50° to 60° Farhenheit of heat. Eight days later, shoots may be gathered, cutting under the top.

SPINACH (Persia))

Spinacia oleracea, L.; French: *Epinard.*

Use

Spinach constitutes a light and healthy food; it is used in the making of lean soups (with herbs), herb broth. It is also prepared in various ways; with butter, cream or uice, having been previously cooked in water, drained and chopped thin. Mixed with sorrel, it corrects the latter's acidity. Of all vegetables, it is the one containing most iron; excellent for persons suffering from anaemia.

Cultural requirements

It is extremely easy; it only needs abundant manure, and waterings with liquid manures or dung.

Sow in April-May, broadcast or in rows, thin, weed, hoe and water when required. Gather leaves as soon as large enough; a larger crop is gathered in this way than in cutting the plant.

As the plant runs to seed very quickly, repeat sowing every 15 days. We have sown spinach around August 15th and were able to gather before hard frosts. Plants could even spend the winter on the ground if covered with leaves or manure and straw and would yield an abundant and lengthened crop in the spring.

Varieties: — Winter, *Prickly seeded Spinach*, autumn, *Monstruous Viroflay*, summer *Lazy Cotillon.*

SORREL

Rumex acetosa, L.; French: *Oseille.*

Use

Cooked leaves are consumed alone or in most cases mixed with spinachs.

Cultural requirements

Sorrel is a perennial which is just as well raised by dividing stalks as from seed. The first process is particularly used in the planting of borders.

It is sown in the spring, May-June, in rows 8 to 10 inches apart in beds. When the plants have come out, thin to 4 or 5 inches, hoe and mulch.

As in the case of the spinach, one will always select the leaves that are better developed when gathering. When a crop is 3 years old on the same bed, it is considered as exhausted and must be replaced either from seed or by dividing the leaves.

Varieties: — *Large-leaved French Sorrel, Maiden Sorrel for borders.*

CELERY

Apium graveolens, L.; French: *Céleri.*

Use

The celery plays a great part in the culinary art, and cooks would be much embarrassed without it. They use it in all dishes: soup, stew, pies, etc. It is consumed cooked under meat or fried or in white sauce, even in the raw state and in salad.

Cultural requirements

Early celery is sown in *beds* around March 15th; late season plants, at the end of April. As the seed takes a long time to germinate, continual cares are imperative. In order to obtain a proper germination, the seed must be sown very shallow and the ground often and slightly watered until the plant has grown roots. As soon as they will have formed 2 or 3 leaves, shift plants, 2 inches apart.

They are permanently transplanted in June in a cool soil, loose, copiously manured with well-rotted manures. Before planting, the end of leaves and roots is slightly trimmed away. (Pl. VII, fig. 3).

Plants are set either in rows 24 to 48 inches apart, 2 inches deep and 8 to 10 inches distant in the rows; either in trenches 3 ft distant, 12 inches deep, in the bottom of which is laid a layer of 3 inches of compost or rotted manure covered by a similar layer of rich soil of the same thickness, the plants being 6 to 8 inches distant; or in double rows (particularly early celery) 8 to 10 inches in all directions, providing for about 4 ft between each double row.

They may again be planted in trenches 1 ft deep by 1½ ft wide in ground properly prepared in advance. The bottom is worked up with a spade and 4 to 5 inches thick of well rotted manure spread and trampled on and covered with 6 inches thick of earth from the trench. The surface is afterwards levelled with a rake and rays traced; two rows will suffice. Radishes and lettuce may be grown between celery plants which take some time to develop. Cultivation consists in hoeings, mulching and waterings. Celery requires plenty of water; its vegetation is much hastened by liquid manures, nitrate of soda, poultry dung, etc.

When fully grown, it is blanched by excluding the light. Any method is good that obtains this result without causing rust. They may be earthed up if the soil is loose and sandy. In heavy grounds, they must be surrounded with straw, or pasteboard cones or cylinders.

In market gardening, this result will be obtained by fixing boards on each side of the row (Pl. VII, fig. 8).

It must be kept erect in 6 or 8 inches thick of sand, in a well-ventilated cellar or storage pit, hardly lighted, wherein the temperature, which is rather cool than damp, will be maintained at 38° Fahrenheit.

Celery plants are packed in one dozen bunches tied with raffia and put in crates, 2 ft x 2 ft and 20 inches high (Pl. VIII, figs 8 and 9).

Varieties: — *Golden Self-Blanching or Paris Golden Yellow or Chemin, Giant Pascal, White Plume.*

CORN SALAD

Valerina Locusta, L.; French: *Mâche.*

Use

Is used as a salad; excellent, softening and delicious.

Cultural requirements

Grows in any soil. Is sown broadcast, to stay. Sown at the end of July, it is fit for use before frosts come and is kept more than one month after gathering. Sow, roll properly, water if necessary and weed.

Varieties:—*Round-leaved Corn Salad, Green cabbaging Corn Salad.*

NEW ZEALAND SPINACH

Tetragonia expansa, M.; French: *Tétragone.*

Use

Is used as spinach.

Cultural requirements

During the hottest days, when spinach can no longer be cultivated, the New Zealand spinach, which is to the contrary fond of excessive heat, gives an abundant crop. Sow in pots under sashes in April to be set to stay in June, 2 ft apart in all directions. It is also sown in the early spring, where it is to grow. Keeping the ground clean is all that is required and leaves may be gathered during the whole summer.

As the seed is tough and germinates with difficulty, it would be advisable to soak same in lukewarm water for 12 hours.

SWISS CHARD BEET (Persia)

Beta vulgaris, L.; French: *Poirée.*

Use

This plant is being grown since over two thousand years. It is the most emollient legume and all its parts are good. Leaves are used like cabbage in bean soup. Mixed with sorrel, of which it corrects the acidity, it makes a delicious herb dish, either with cream or juice. Leaf-stalks, sometimes as broad as the hand and fleshy, are prepared in various ways after being boiled in salt water; in white sauce, cooked with butter or browned. They are also consumed in vinegar sauce, like asparagus. It is a precious vegetable but not enough known.

Cultural requirements

Swiss chard is very easily grown, and it may be added that no vegetable plant gives such an abundant crop in return for so little attention.

It is cultivated in the same way as the beet. It needs suitable soil, copiously manured, plowed deep and loosened. It is sown in May, with the beet, 3 rows to a bed, 1 ft apart in the row. Three seeds are sown, 1 inch deep and when grown only the finest one is allowed to remain. Tillage consists in frequent hoeings; mulching is also of some assistance. One month later, one may start gathering the first ribs and continue without interruption until it freezes.

We succeeded in having them stay out during the winter, earthed up with wheat chaff and manure, their leaves being tied together and thoroughly covered with dry leaves. This process is followed in France, around Lyon, where this plant is grown on a large scale. In so doing, their leaves will develop in the early mild days of the following spring, and 15 days later, we will start gathering, only stopping by the middle of the summer when plants will run up to seed. In order to obtain strong and unexhausted plants, the beet is sown in June, transplanted to stay in July and cultivated without gathering the first year.

Varieties: — *White or yellow cutting leaf-beet, Large-ribbed white silver leaf swiss chard, Silver-leaved green ribbed swiss chard, Lyon Green-Leaved.*

RHUBARB

Rheum, L.; French: *Rhubarbe.*

Use

Fleshy leaf-stalks of this plant are used in making preserves and tarts.

Cultural requirements

Rhubarb is sown in May-June in nursery and planted to stay the following year.

It requires healthy and deep ground, well loosened and manured. It must be planted 3 or 4 ft apart in all directions.

Plants may be propagated by shoots from old bunches; this is the best means to multiply the best varieties; those having the longest and most fleshy leaf stalks. To hasten the growth of young stalks and in order to have them tender, all that is required in the spring, is to place a barrel opened at one end on the plants and surround with hot manure. All flower stalks must be removed as soon as they appear in order to prevent the exhausting of the plant.

Varieties:—*Victoria, Mitchell's Royal Albert, Hybride Florentin, Monarch and Red Early Tobolsk.*

CHAPTER IV

FRUIT VEGETABLES

SWEET CORN

Lea Maïs, L.; French: *Maïs sucré* (*Blé d'Inde*)

Use

Ears picked before complete ripeness, when seeds are still milky, are consumed boiled or in butter sauce. Gathered young and pickled they are an excellent condiment.

Cultural requirements

Corn thrives in a light soil, loose, warm and abundantly manured. Seeds are sown between May 15th and June 15th in rows 3 ft apart in all directions, 5 seeds being put together, only three seedlings being allowed to stay once they have come out. In sowing several varieties, from the earliest to the latest, gathering may last until frosts. Cultural attention consists in hoeings, waterings and earthing up. Should the surface of the earth become crusty after a rainfall, it shall be hoed, even before seedlings appear. Once plants have come out and have been thinned it will be profitable to them to hoe frequently until about 1 ft high, but this must rather be done in the middle of the day, at which time they are less apt to break.

It is equally advisable, although not absolutely necessary, to remove shoots growing at the foot of the plant, also pick them up to hasten the formation of ears.

Varieties: — *Early Cory, Early Crosby, Golden Bantam, Early Malcolm, Peep O'Day.*

Late, *Country Gentleman.*

MELON

Cucumis Melo, L.; French. *Melon.*

Use

It is consumed at the beginning of a meal as it is refreshing and stimulates the appetite; it is indigestible for certain stomachs.

PLATE VI

Figs: 1.—Dwarf bean; 2.—Pole bean; 3.—Peas; 4.—Corn; 5.—Broad bean; 6.—Tomato; 7.—Onion "Red Wethersfield"; 8.—Onion "White Globe"; 9.—Onion "Prizetaker"; 10.—Custard Marrow; 11.—Egg-plants 12.—Squashes; 13.—Cucumber; 14.—Turban Squash; 15.—Cantaloup Melon; 16.—Pumpkin.

This delicious fruit classed, we do not know too much the reason, amongst vegetables, could be grown on a larger scale if earlier varieties were adopted. Experts in this culture and deservedly reputed, excel in producing the Montreal Nutmeg which is, of course, very good but not any more than mony other varieties known to us and that have this advantage of ripening almost one month earlier.

In order to succeed with the Montreal Nutmeg, we must have a special equipment and a perfect knowledge of its cultivation; if not, we only succeed in putting it on the market too late, when it is not of any more value than squash

We will advise all amateur gardeners who want to grow melons, to select small or medium-sized but early varieties. Then they will be sure to use them when the weather is hot, when they are delicious and much sought for.

For two consecutive years, we had the Bellegarde Cantaloup ripe on July 14th (Pl. VI, fig. 15). This variety together with the Early Black Rock and the Prescott will certainly not cause any deceipt.

Cultural requirements

To make a success of this crop, sashes are needed until the first days of July.

Start sowing directly in beds around the end of March, to shift in pots later on; or again sow in pots or baskets and when they have come out, reduce to two by removing those of poor appearance.

Dressing or Pruning

Pruning must start on plants in pots or baskets even when on the bed and before being transplanted to stay, which is towards the latter part of May. We proceed as follows:

1st Pruning: After cotyledons have formed, the plumule or stalk of the plant grows between them. As soon as the latter has grown 3 leaves, a cut is made above the *second*, nipping off the buds that would otherwise develop on cotyledons.

2nd Pruning: Pruning the second leaf has caused the sprouting of 2 buds: lateral branches. After allowing them to throw 4 leaves, they will be pruned after the *third*, which will cause the throwing out of 6 branches that will constitute the frame of the plant.

3rd Pruning: These 6 branches will in turn be pruned after the *third* leaf and on the two new branches that will come out, the first fruits will appear; if not, we will operate again, and in the same manner, these branches, after the third leaf.

Then, as soon as the fruit is set and has the size of a walnut, we only have to cut the stalk bearing it after the following leaf and to do with some of the useless branches that carry no fruit. We will leave only 2 on each plant, unless they be small. The future prunings consist in pinching the ends of all stalks as soon as they appear and develop in order to drive back the sap and feed the fruit. When fruits have reached the size of the fist, care should be exercised to prevent them from coming in contact with the earth, but to isolate them with a small board, brick, flat stone or shingle.

How to prepare the deep bed

The melon should be planted on a deep bed. In this view, the soil where the melon-bed is to be established will be plowed and plenteously manured and trenches dug, 2 ft wide by 1½ ft deep, into which will be deposited 1 ft of hot manure, trampled hard. At every 3 ft or on the spot selected for the melon, good compost will be deposited in the shape of a small hill, then the trench earth will be thrown back in place, levelled, and frames and sashes placed. A few days later, we will start planting, taking great care not to damage roots.

Attention

Young planted melons fear the burning rays of the sun and will require shading; otherwise young plants might fade and dry up.

We must also water whenever required with chilled off water or warmed in the sun, and always a little distant from the melon so as not to moisten leaves, also ventilate when the temperature is favourable but always on the opposite side of the wind.

When melons are vigorous and fill the frame, the latter is raised by introducing 4 bricks, one at each corner, and this to enable them to spread outside. It is advisable not to remove sashes as long as the nights are cool.

Cultural attention consists in hoeing slightly as roots are close to the surface A good proceed consists in mulching abundantly immediately after planting and in continuing to do so as the stalks grow longer. This will retain coolness and will avoid doing several waterings.

Picking

The fruit is picked when ripe. This is recognized by its fragrant scent, its colour or by a circular crack appearing around the stem.

SQUASH

Cucurbita, L.; French: *Courge.*

There are several kinds in existence but the following are the best known:

1—*Pumpkin*; French: *Potirons* (citrouilles).
2.—*Turban Squash*; French: *Giraumons.*
3.—*Custard Marrow*; French: *Pâtisson.*

Use

Squashes are used frequently. They are prepared in several ways; they make delicious soups by adding milk and excellent porridge. Squash cooked in salt water, pressed after cooking, then strained and cooked in the oven with eggs, milk, cream and cheese is a real feast. Squash tarts thus prepared delight many a connoisseur.

Cultural requirements

All this lineage belonging to the family of the cucurbitaceae, however of different shapes, is cultivated in the same manner. Early frosts are so much to be feared in our Province that we would not advise to sow directly into the ground; because if we can succeed to have thoroughly ripe fruits in a warm season, the same results will not be achieved if we have frosts in September.

As a precaution, let us sow all our seeds of cucurbitaceae towards the end of April, in pots in beds, so as to set them to stay one month later. Besides being a gain of such a length of time, insect pests will also cause less damage.

Custard marrows, Turban squashes and *non-running squashes* are planted 4 ft apart in rows 5 ft distant *Pumpkins* and *large-growing squashes* 8 ft distant in rows 10 ft apart.

Open a ditch as already said for melons or only dig a hole 2 ft square, put manure, compost and cover for plantation.

Vegetable marrows are gathered when about one-half of their size. Others are gathered when perfectly ripe, being careful not to bruise them which would cause rot.

Varieties:— Squashes: *Long White Bush Marrow, Californian Marrow, Green Hubbard, Winter Crookneck.*

Pumpkins: *Small Sugared Pumpkin, Etampes Mammoth Red, Connecticut field.*

Custard Marrows: *White bush or American White Custard Marrow, Yellow Bush and Golden Custard Bush.*

Turban Squashes: *Essex hybrid, Turban Squash*

CUCUMBER (India)

Cucumis sativus, L.; French: *Concombre.*

Use

The cucumber has been known to the Indians since more than 3000 years. It is much consumed in warm countries on account of its highly refreshing qualities. It is eaten in the raw state, in salad, well seasoned or again cooked with bean or fat and basted with gravy. In the raw state it is indigestible; cooked, it is delicious.

It is grown in the same way as melons; 4 ft apart in rows 6 ft distant. Early sowing in bed, and later sowing in the ground. Cucumber may be pruned exactly as the melon but after 6 leaves instead of 3.

Varieties:—*White Spine, Long Green, Davis Perfect, Paris Pickling.*

KIDNEY BEAN (French bean)
(Central America)

Phaseolus vulgaris, L.; French: *Haricot (fève).*

Use

Green snaps, before the grain forms, are of a very delicate taste; after being cooked in salt water they are left to drain and consumed stewed in butter with onion. Dry shell beans, slowly cooked with pork, tomato sauce, parsley and seasoned to taste make a wholesome and delicious dish; it is the well-famed *cassoulet* in Southern France

Cultural requirements

The kidney bean needs healthy. loose and light soil, also enriched by organic matters; it fears compact soils with impermeable sub-soils and *fresh manures.*

For garden cultivation, the best sowing method consists in planting 4 or 5 seeds in a hill. These hills form small bushes wherein bean pods are shaded and by the fact more tender.

Dwarf varieties are sown in hills 1½ ft distant in rows 2½ ft apart. Planting will take place only when frosts are no longer to be feared, around the end of May; the earth must equally be warm, otherwise the seed would rot.

Cultural attention consists in hoeings and earthing up. A little quantity of azote would also be advisable as soon as beans have grown up; liquid manure diluted in water or poultry dung would hasten vegetation.

Gathering must take place twice a week, regularly; if not, pods would become tough and stringy. So as to lengthen the period of gathering it would be a good idea to sow at every interval of 15 days up to the middle of July.

Pole beans, little used, are more productive and last until frosts. They are sown in beds of 3 rows 12 inches apart and 10 inches distant in the row. When beans have come out, when they have been hoed and earthed stalks are driven into the ground solidly and so as to protect the plant and enable it to twist up around.

The only cultivation required is hand weeding.

Varieties: —Tough-podded pole beans; *Soissons.*

Edible podded pole beans: *Edible podded bean, Algerian, Lavallée, King of skinless pole beans, Avant-Garde, Château-Salins.*

Tough-podded dwarf beans: *Bagnolet, Flageolet, Chevrier, French Wonder, Early Etampes,* etc.

Edible podded dwarf beans: *Emperor of Russia, Lyon's Glory, Black Hermitage, etc.*

PEA (Persia, Caucasus)

Pisum sativum, L.; French: *Pois.*

Use

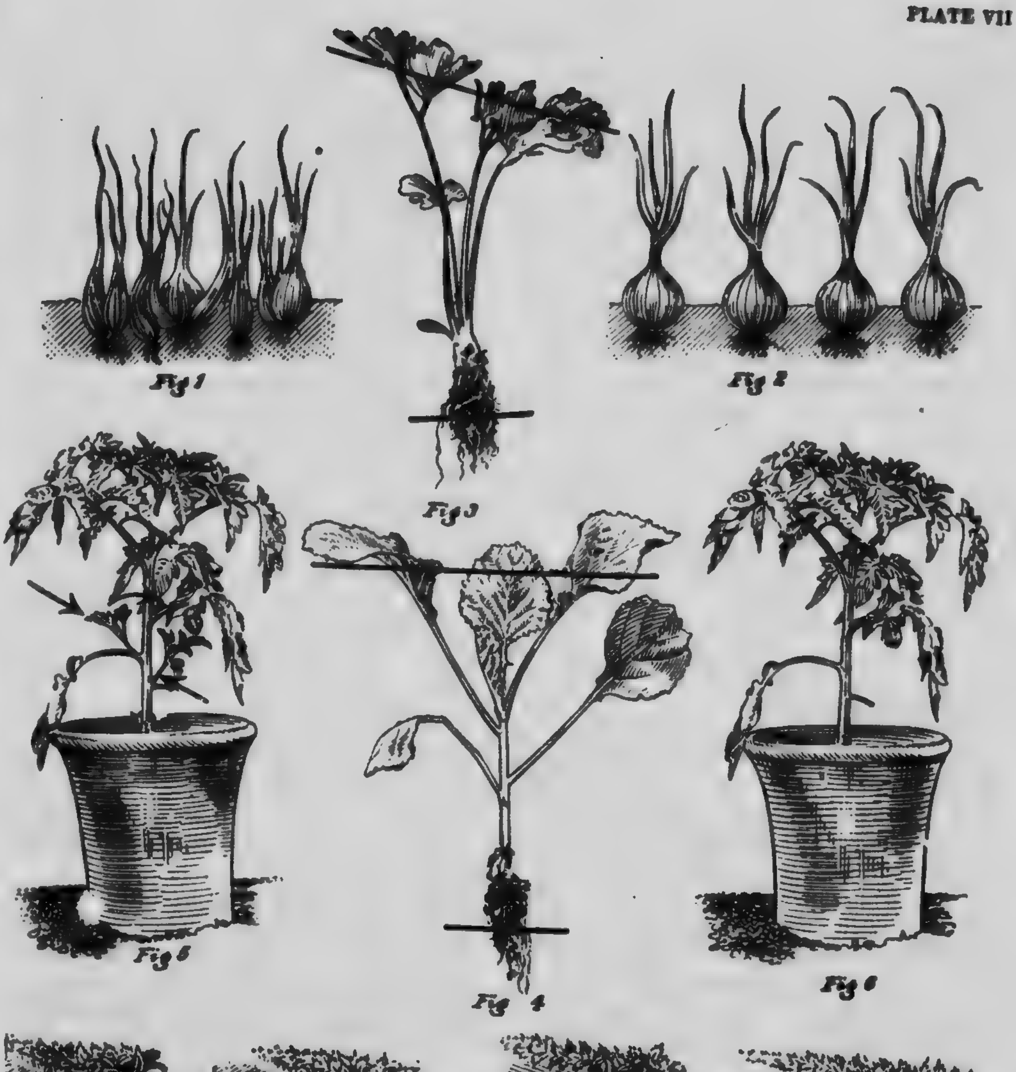
Fresh peas are consumed when the grain is about half-formed; sweetened, they make an excellent dish and are considered very healthy. They are much appreciated. They are served alone, in stew or with game or some other meat or again with cream. Peas with newly-salted pork together with lettuce head in juice or cream are delicious.

Cultural requirements

The earliest must preferably be sown in a light soil; late peas, in heavier ground on old manure of the year before, added with ashes, but never with fresh manure. Sow as soon as possible as soon as the earth has warmed up: *dwarf* varieties in rows 2 ft distant, 1 inch apart in the row, hoe and earth up; early *pole* varieties, in beds of 3 rows, 10 inches apart and 1 inch distant in the row; weed, earth up and stake with branches having their twigs on.

Shrivelled-grain peas, being later and thriving better under extreme heat should be the last sown, about June 15th.

Pick out carefully so as to collect only those that are enough filled.



Figs: 1.—Onions badly thinned; 2.—Onions properly thinned; 3.—Pruning of a celery plant; 4.—Pruning of a cabbage plant; 5.—*Leaves* to remove when pruning a tomato plant; 6.—The same plant after pruning; 7.—How celery should be banked up in light ground; 8.—How to do so in heavy ground.

Varieties: — Early Pole peas: *Gregory Surprise, Gradus, Thomas Laxton, Nott's Excelsior, Prince Albert, Express, Michaux, Serpette.*

Late pole peas: *Gradus, Telephone, Senator, Knight's shrivelled.*

Dwarf peas: *Fill-Basket, Levêque, American Wonder, Stratagem, Dwarf Green Shrivelled, Wilson.*

Edible podded pea; *Ramshorn sugar pea.*

BROAD BEAN (Asia)

Vicia Faba, L.; French: *Fève (Gourgane).*

Use

The broad bean, like the kidney bean, is the equal of meat. It would consequently be in one's interest to sow a few feet, if not more. It makes a thick soup that may compete with pea soup.

Cultural requirements

The broad bean is sown in the early days of spring, in rows 1 ft apart, 8 inches distant in the row, or again broadcast as a field crop.

During the growth, one or two hoeings will be made until all trace of dew has disappeared. It is also recommended to pinch (cut) the extremity of the stem when 1½ ft high, this forces the sap back and feeds the pods.

They are picked before ripening to be consumed green, or when the plant turns yellow if seeds are intended to be consumed dry.

Varieties:—*Séville, Aquadulu, Windsor,*

TOMATO (Peru)

Solanum Lycopersicum, L.; French: *Tomate.*

Use

It is of general use; in the raw state or cooked, it is consumed in enormous quantities. It is not only canned but preserved as well. It is used to season meats, soups, etc.

Cultural requirements

In order to grow the tomato needs strong heat; it thrives best in light and cool soils, easily warming up, very rich in organic and mineral matters; it is particularly fond of phosphoric acid and potash; adding superphosphate or wood ashes will always give good results. The soil must be permeable, plowed deep and loosened.

As the tomato cannot be set in the open until frosts are no longer to be feared, so as to hasten the production, it must be sown in hotbeds between March 15th and 20th. As soon as the young plants are strong enough, they are shifted, 2 inches distant, to another bed, shifting again three weeks later, 4 inches apart. At this interval they can wait to be permanently transplanted which will be done by the end of May or beginning of June.

The shifting of tomato plants is of absolute necessity; otherwise they would become thin and excessively high, whereas, to the contrary, short, dumpy and well shaped subjects must be looked for. Besides the plant shifted twice may be displanted without any injury as it is always pulled out with a large ball of earth which insures its retaking and hastens its production. It has been demonstrated through experiments that plants shifted twice have doubled the production of those that have not been shifted.

Tomatoes are planted 2½ ft distant in rows 4 ft distant. Special pains must be taken when planting to conserve the earth adhering to the roots of the plant. A hole is made with a spade, the plant is set in deep, and the earth is moderately firmed all around and watered.

In order to have nice fruits, clean, and ripe early, the tomato must be pinched and staked.

Pinching

Once the plantation is made, a stake 5 or 6 ft high and about the size of a broom-stick, is fixed into the ground near each plant and to which the latter is tied.

Pinching off consists in training the plant to one stem: it will then be necessary to remove all those coming out in the axil of each leaf (Pl. VII, figs 5 and 6) a soon as they appear. The idea is to have the single stem grow as quickly as possible and form fruits. The sap must consequently not be allowed to spread to shoots that will be removed. This suppression will be practised at least every eight days and the shoot will be tied so as not to be broken by the wind.

Liquid manures are very efficient to activate the growth of tomatoes. They contain a large quantity of potash and provide suitable food.

Tillage consists in frequent hoeings, mulching if possible and watering in dry weather.

The same disease as potatoes also injures tomatoes. Bordeaux mixture, every 15 days will be a good preservative. When the plant is 5 ft high it is topped so as to drive the sap back to the fruits which are numerous. During hot days, keep all leaves; some will be trimmed away only late in the fall to hasten the ripening of fruits.

Varieties: — *Extra Early, Bonny Best, Chalk's Early Jewel, Earliana, Perfection, Ponderosa.*

EGG-PLANT

Solanum Esculentum, L.; French: *Aubergine.*

Use

It is consumed cooked in various ways.

Cultural requirements

The egg-plant is one of those that require much heat; sowing must necessarily be made on hotbeds, early in March, then shift the plant three weeks to one month later. Like the tomato, it may be set in place to a good exposure, in light soil, preferably in front of a wall. Give plenty of water and mulch. During dry weather, it needs plenty of water, waterings will consequently not be spared.

Pruning

In order to obtain nicely developed fruits, it is useless to say that plants must be properly pruned. Many a gardener are satisfied to leave only a small number of fruits to each plant and late in the summer, to pinch the end of the stems. It is preferable to prune the main stem above the second flower or second bunch of flowers, only keeping four or five shoots and to trim away all others, particularly the shoots at the base of the plant. Each of the remaining shoots is in turn pruned above the second flower after which all buds are cut away as they appear, only allowing one to remain as *sap drawer.*

The egg-plant is liable to be attacked by the Colorado potato beetle. Particular care must be taken to destroy same before it lays its eggs, also spray with arsenate of lead or Paris green.

The egg-plant is very sensible to the action of fertilisers and excellent results have been obtained with the following formula, per 100 sq. yards:

Nitrate of soda, 4 lbs.

Superphosphate of lime, 6 lbs.

Chloride of Potassium, 2 lbs.

Varieties: — *Long Purple, Extra Early Barbentane, Extra Early Purple Dwarf.*

CHAPTER V

CONDIMENT VEGETABLES

RED PEPPER

Capsicum, L.; French: *Piment.*

Use

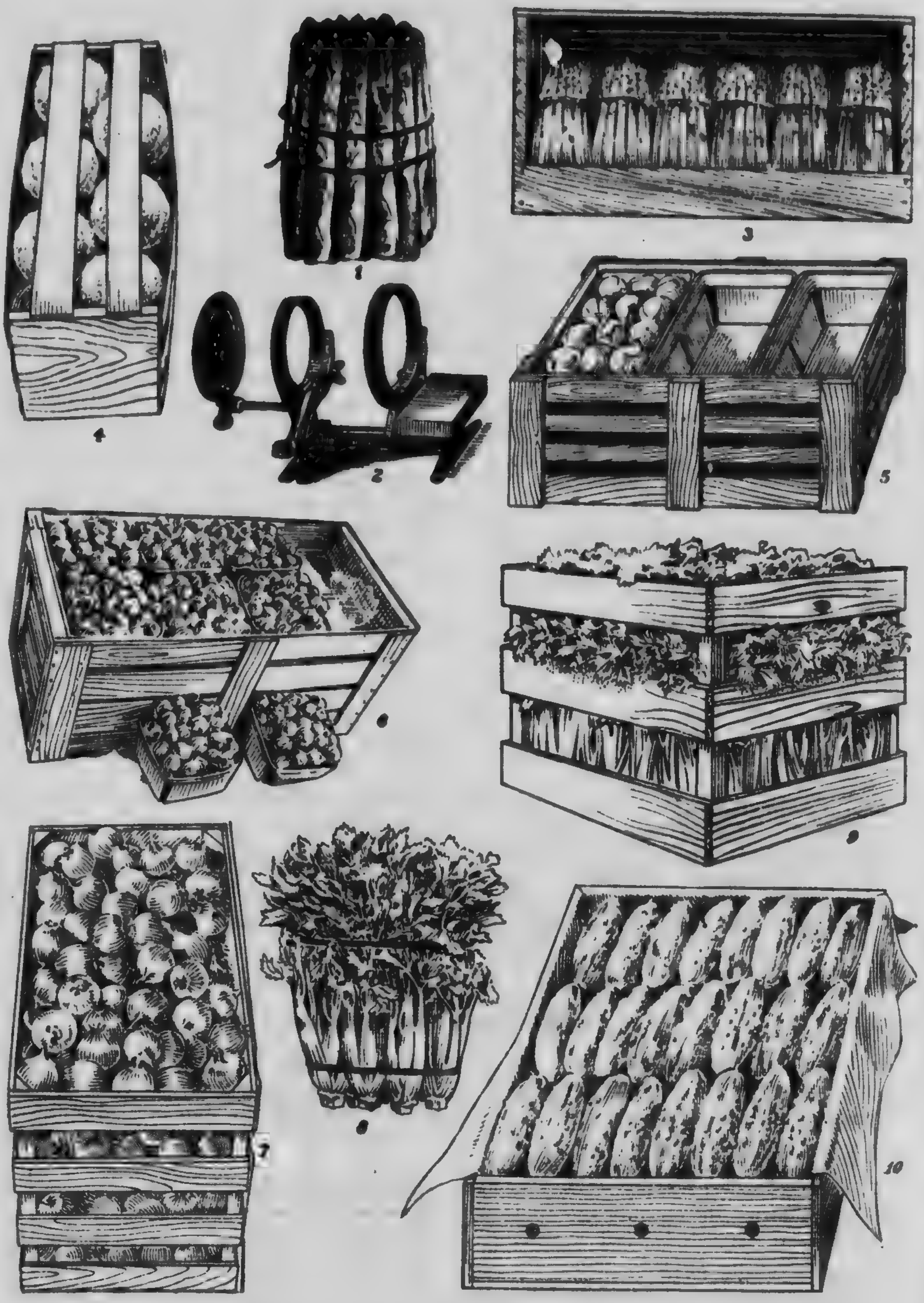
In hot countries, the green or ripe fruits of red pepper are extensively used as seasoner.

They are equally pickled. Dried and reduced to powder it is made into Cayenne pepper. Fruits of large fleshy varieties, without any burning taste, are used as vegetables, either in the raw state in salad or cooked like egg-plants.

Cultural requirements

It is exactly the same culture as that of the egg-plant. Sowing in hotbed, shifting and permanent plantation to a warm exposure.

PLATE VIII



COMMERCIAL PACKING OF VEGETABLES

Figs: 1.—Bunch of asparagus; 2.—Asparagus buncher, "How to pack"; 3.—Asparagus; 4.—Melons; 5.—Tomatoes; 6.—Brussels sprouts; 7.—Onions; 8 and 9.—Celery plants; 10.—Cucumbers.

It is pruned like the egg-plant so as to leave only 12 to 15 fruits on each plant.

Varieties: — *Cardinal, Sweet Mountain, Golden Dawn, Mammoth, Golden Queen, Sweet Spanish.*

Some other varieties with very small fruits also serve in adorning plots and baskets.

Use

These various plants are used to aromatize or improve the taste of food, meats, etc. We will mention them only.

GARLIC

Allium sativum, L.; French: *Ail.*

Garlic grows in healthy and loose soils; it often rots in wet grounds. The land will be manured with nothing but well-rotten compost; fresh manure is injurious.

Cultural requirements

Sow early in the spring; bulbs are divided and planted 2 inches apart in rows 6 inches distant, there being 6 rows to a bed. Weeding once and keeping the ground free of weeds is all that is required. Gathering is made in July and August. When stems turn yellow, pull out and dry for a few hours, then tie in bunches and store in dry place

SHALLOTS

Allium ascalonicum, L.; French: *Echalotte.*

Cultivated on the same ground and in the same way as garlic.

CHIVES

Allium Schoenoprasum, L.; French: *Ciboulette.*

The fine and numerous leaves of chives form grass-like bunches on old plants. Leaves have the onion taste and are used chopped in many dishes.

Chives also make excellent borders; it is propagated in the spring by division of the root.

PARSLEY

Apium Petroselinum, L.; French: *Persil.*

Leaves are used in the raw state or cooked to aromatize dishes.

Cultural requirements

It may be cultivated on borders. Sow from April to July, cover seed lightly, roll and mulch.

CHERVIL

Scandix Cerefolium, L.; French: *Cerfeuil.*

Chervil is used to season salads. This annual plant is sown as parsley.

TARRAGON

Artemisia Dracunculus, L.; French: *Estragon.*

Delicious plants the stems and leaves of which serve to aromatize salads, sauces, vinegars, etc.

It does not produce any seed; can only be propagated by division of roots in the spring.

SAVORY

Satureia hortensis, L.; French: *Sarriette.*

Same use. Is sown in the spring like parsley.

FRENCH THYME

Thymus vulgaris, L.; French: *Thym.*
Same use and same culture.

PART III

USEFUL INFORMATION

KINDS OF SOILS PARTICULARLY SUITED TO THE VARIOUS VEGETABLE PLANTS

RICH CLAY LOAM, LIGHT AND SANDY

Asparagus.
Beet.
Carrot.
Cucumber.
Cabbage (early).
Swede Turnip.
Cauliflower (early).
Squash.
Spinach.
Kidney bean.

Corn.
Peas.
Red Pepper.
Radishes.
Rhubarb.
Onion (early).
Tomato.
Melon.
Celery.
Celeric.

HEAVY LOAM—CLAYEY

Head cabbage.
Brussels Sprouts.
Cauliflower (late).
Kidney bean.

Onion.
Parsnip.
Leek.
Dandelion.

VEGETABLE PLANTS REQUIRING A VERY WARM EXPOSURE

Kidney bean.
Corn
Cucumber.
Egg-Plant.
Pumpkin.

Squash.
Melon.
Red Pepper
Tomato.

Plants that may be sown in hotbeds or in nursery and shifted (S) before permanent plantation. Plants sown in pots (P) or vases.

Artichoke
Cauliflower (*S*).
Celery (*S*).
Cabbage (*S*).
Cardoon (*P*).
Tomato (*S*).
Beet.
Red Pepper (*S*).

Squash (*P*).
Lettuce.
Cucumber (*P*).
Melon (*S*.)
Pumpkin (*P*).
Corn.
Swiss Chard.
Onion.

PLANTS TO BE SOWN WHERE TO STAY

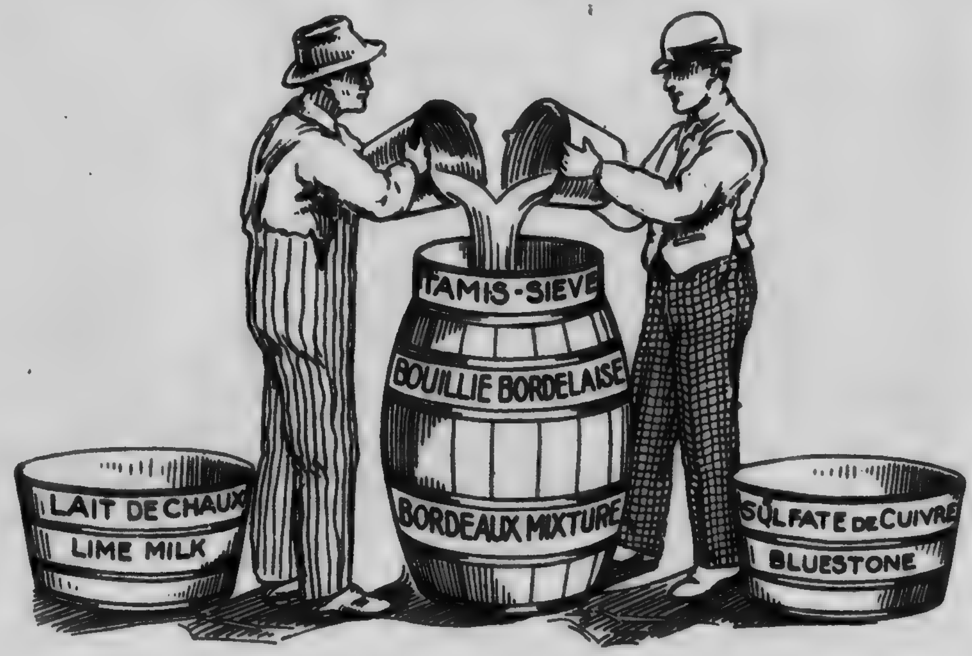
Beet.
Carrot.
Chervil.
Swiss-chard.
Spinach.
Kidney Bean.
Lettuce.
Corn Salad.

Turnip
Onion.
Parsnip.
Parsley.
Dandelion.
Peas.
Radish.
Scolymus.

SYNOPSIS OF VEGETABLE CULTURE

VEGETABLES	Germinal power of seeds	Seed or plants required for 100 feet of row	Depth of planting	Distance between plants		
				Between rows		In rows
				Horse cultivation	Hand cultivation	
Artichoke	6 to 8 years	½ ounce	1 to 2 inches	3 to 4 feet	1 to 2 feet	2 to 3 feet
Artichoke, Jerusalem		2 qts of tubers	2 to 3 "	3 to 4 "	1 to 2 "	1 to 2 feet
Asparagus, seed	5 to 7 "	1 ounce	1 to 2 "	30 to 36 inches	1 to 2 "	3 to 5 inches
Asparagus, plants	5 to 7 "	60 to 80 plants	3 to 5 "	3 to 5 feet	1 to 2 "	15 to 20 inches
Bean, Kidney	3 to 6 "	1 pint	½ to 2 "	28 to 36 inches	18 to 24 inches	4 or 6 to 10 inches
Beet	4 or 5 "	2 ounces	1 to 2 "	24 to 36 "	12 to 18 "	5 or 6 to 12 inches
Brussels Sprouts	5 or 6 "	¼ ounce	½ "	30 to 36 "	24 to 30 "	16 to 24 inches
Cabbage, early	5 or 6 "	¼ ounce	½ "	30 to 36 "	24 to 30 "	12 to 18 inches
Cabbage, late	5 or 6 "	¼ ounce	½ "	30 to 40 "	24 to 36 "	16 to 24 inches
Cardoon	6 to 8 "	½ ounce	1 to 2 "	3 feet	2 feet	12 to 18 inches
Carrot	4 or 5 "	1 ounce	½ "	30 to 36 inches	18 to 24 inches	6 or 7 to 12 inches
Cauliflower	5 or 6 "	¼ ounce	½ "	30 to 36 "	24 to 30 "	14 to 18 inches
Celery	6 to 8 "	¼ ounce	1-8 "	3 to 6 feet	18 to 36 "	4 to 8 inches
Celeriac	6 to 8 "	¼ ounce	1-8 "	30 to 36 inches	18 to 24 "	4 or 5 to 12 inches
Chervil	2 to 4 "	1 ounce	1 "	30 to 36 "	18 to 24 "	3 or 4 to 12 inches
Chicory	6 to 8 "	¼ ounce	½ "	30 to 36 "	18 to 24 "	4 or 5 to 12 inches
Corn, Sweet	2 to 4 "	½ pint	1 to 2 "	36 to [illegible] "	30 to 36 "	30 to 36 inches
Cornsalad	4 to 6 "	2 ounces	½ to 1 "	30 "	12 to 18 "	5 or 6 to 12 inches
Cress common garden	5 to 8 "	¼ ounce	½ to 1 "	30 "	12 to 18 "	4 or 5 to 12 inches
Cress, water	5 to 8 "	¼ ounce	on the surface	broadcast	……	
Cucumber	4 or 5 "	½ ounce	1 to 2 inches	4 to 6 feet	4 to 6 feet	4 to 6 feet
Dandelion	1 or 2 "	¼ ounce	½ "	30 inches	18 to 24 inches	8 to 12 inches
Egg-Plant	6 to 8 "	1-3 ounce	½ to 1 "	30 to 36 "	24 to 30 "	18 to 24 inches
Endive	8 to 10 "	1 ounce	½ to 1 "	30 "	18 "	8 to 12 inches
Kohlrabi	3 or 4 "	¼ ounce	½ "	30 to 36 "	18 to 24 "	4 to 8 inches
Leek	2 to 4 "	½ ounce	1 "	30 to 36 "	14 to 20 "	4 to 8 inches
Lettuce	4 or 5 "	½ ounce	½ "	30 "	12 to 18 "	4 to 6 inches
Melon, Musk	1 or 5 "	½ ounce	1 to 2 "	8 to 12 feet	6 to 8 feet	in hills, 6 feet
Melon, Water	4 or 5 "	½ ounce	1 to 2 "	8 to 12 "	8 to 12 "	in hills, 10 feet
Onion, Seed	2 to 1 "	1 ounce	½ to 1 "	24 to 36 "	12 to 18 inches	4 or 5 to 12 inches
Onion, sets		1 quart	1 to 2 "	24 to 36 "	12 to 18 "	4 or 5 to 12 inches
Parsley	3 to 5 "	¼ ounce	1-8 "	24 to 36 "	12 to 18 "	3 to 6 inches
Parsnip	1 or 2 "	½ ounce	½ to 1 "	30 to 36 "	18 to 24 "	5 or 6 to 12 inches
Peas	2 to 4 "	1 pint	2 to 3 "	3 to 4 feet	30 to 36 "	5 to 12 inches
Pepper	4 to 6 "	1-8 ounce	½ "	30 to 36 inches	18 to 24 "	15 to 18 inches
Potatoes	Annual	5 pounds	3 to 4 "	30 to 36 "	24 to 36 "	14 to 18 inches
Pumpkin	4 to 6 years	½ ounce	1 to 2 "	8 to 12 feet	8 to 12 feet	in hills, 8 to 12 feet
Radish	5 to 7 "	1 ounce	½ to 1 "	24 to 36 inches	8 to 12 inches	1 to 2 inches
Rhubarb, seed	3 to 6 "	¼ ounce	½ to 1 "	36 "	30 to 36 "	6 to 8 inches
Rhubard, plants		33 plants	2 to 3 "	3 to 5 feet	3 to 5 feet	3 feet
Salsify	2 to 4 "	1 ounce	½ to 1 "	30 to 36 inches	18 to 24 inches	2 to 4 inches
Spinach	4 or 5 "	1 ounce	1 to 2 "	30 to 36 "	12 to 18 inches	7 or 8 8 to 12 inch.
Squash	5 to 8 "	½ ounce	1 to 2 "	3 to 4 feet	3 to 4 feet	in hills, 3 to 4 feet
Swiss-Chard	6 to 9 "	1 to 2 ounces	½ "	24 to 36 inches	18 to 24 inches	6 to 12 inches
Tomato	4 to 6 "	1-8 ounce	½ to 1 "	3 to 5 feet	3 to 4 feet	3 feet
Turnip, Swede	3 or 4 "	¼ ounce	½ to 1 "	30 to 36 inches	18 to 24 inches	6 to 8 inches
Turnips	4 to 6 "	½ ounce	½ to 1-2 "	24 to 36 "	18 to 24 "	6 or 7 to 12 inches

	Time required by seeds to germinate	Date of sowing in hotbeds	Date of transplanting to the open ground	Time required to mature
Bean, Kidney	5 to 10 days		May-June	50 to 80 days
Beet	7 to 10 "		May-June	60 to 80 "
Cabbage, Early	5 to 10 "	March 15th	May	90 to 130 "
Cabbage, Late	5 to 10 "	May 15th	June until July 15th	120 to 150 "
Cauliflower	5 to 10 "	March 15th	May 15th June 15th	100 to 130 "
Carrot	12 to 18 "		May-June	75 to 120 "
Celery	10 to 20 "	March and April	May and June	120 to 150 "
Corn, Sweet	5 to 8 "		May-June	60 to 80 "
Cucumber	6 to 10 "		May 15th, June	60 to 90 "
Endive	5 to 10 "		July and August	90 to 180 "
Lettuce	6 to 8 "	March 15th, April	May	60 to 90 "
Onion, Seed	7 to 10 "		May	130 to 150 "
Onion, Sets			May	90 to 100 "
Onion, Transplanted		March		130 to 150 "
Parsnip	10 to 20 "		May	125 to 160 "
Peas	6 to 10 "		May, June	60 to 90 "
Pepper	5 to 14 "	March 15th	June	100 to 140 "
Radish	3 to 6 "		May, June, August	20 to 40 "
Salsify	7 to 12 "		May	120 to 180 "
Tomato	6 to 12 "	March 15th, April	May and June	130 to 160 "
Turnip	4 to 8 "		May, June, July	60 to 80 "



How the two solutions should be poured to obtain a perfect mixture.

PART IV

INJURIOUS DISEASES AND INSECTS

CHAPTER I

ENUMERATION

GARLIC

Disease: Blight.
Insects: Onion fly, maggot.

ARTICHOKE AND CARDOON

Disease: Mildew.
Insects: White root lice, green leaf beetle.

ASPARAGUS

Disease: Rust.
Insects: Asparagus beetle, asparagus miner.

EGG-PLANT

Disease: Phytophtora infestans.

BEET AND SWISS-CHARD

Diseases: Mildew, rusts, heart rot, yellows.
Insects: Slugs, cutworms, beet fly.

CARROT AND PARSNIP

Disease: Mildew.
Insects: Carrot rust-fly, red spider, carrot maggot.

CELERY, CELERIAC AND PARSLEY

Diseases: Rusts.
Insect: Celery rust-fly.

CHERVIL

Disease: Mildew.
Insects: Red spider, root lice.

LETTUCE, ENDIVE AND WITLOOF

Diseases: Mildew, rust.
Insects: Slugs, white grub, cutworm, wireworm, cabbage looper, plant lice.

CABBAGE

Diseases: Club root, bacterial wilt, white rust.
Insects: Flea beetle, cutworm, cabbage plusia, cabbage looper, imported cabbage worm, cabbage maggot, cabbage lice.

CUCUMBER, MELON, SQUASH, ETC.

Diseases: Bacterial wilt, anthracnose, mildew, leaf-blight.
Insects: Cucumber flea-beetle, aphis, thrips, squash-bug, melon aphis.

SPINACH

Diseases: Mildew, damping-off.
Insects: Green aphis, white grub, cutworms.

BEANS AND PEAS

Diseases: Anthracnose, rust, blight.
Insects: Cutworm, pea weevil, bean weevil, aphis, grasshopper, caterpillar, blister beetle.

CORNSALAD

Disease: Rust.

CORN

Disease: Smut.
Insect: Corn fly.

TURNIP AND RADISH

Diseases: Bacterial wilt, white rust, club root.
Insects: Turnip flea beetle, important cabbage worm, cabbage red bug, cabbage maggot, aphis.

ONION, SHALLOT, LEEK

Diseases: Mildew or blight, smut, black mold, rust.
Insects: Onion fly, onion maggot, thrips, white grub, cutworm.

SORREL

Disease: Rust.
Insects: Sorrel fly, Colorado potato beetle.

POTATO

Diseases: Mildew, mosaic,black leg, dry rot, powdery scab, common scab.
Insects: Colorado potato beetle, white grub, wireworm, blister beetle, plant lice.

SALSIFY AND SCORZONERA

Diseases: White rust, smut.
Insect: Plant lice.

TOMATO

Diseases: Mildew, heart rot
Insects: leaf-beetle, white grub, wireworm

CHAPTER II

DESCRIPTION AND CONTROL OF THE PRINCIPAL INSECTS ABOVE MENTIONED

(Extract from circular No. 33)

Let us say, in the first place, that insect pests above mentioned may be divided in three categories:

1.—**Chewing insects**, or those eating off the foliaceous organs or herbaceous stems of plants, such as: caterpillars, larvae, blister beetles, grasshoppers, leaf-beetles, cabbage worms, etc. They are controlled by poisoning leaves with Paris green or arsenate of lead.

2.—**Sucking insects**, or those that suck the leaves only and cannot be poisoned as they plunge their rostrum in the vegetable tissue itself to get their food, such as: plant lice, bugs, slugs. They are destroyed by substances killing them through contact such as nicotine sulfate or kerosene emulsion, and finally.

3.—**Boring insects**, or those penetrating into the stem or tuber and boring in galleries, such as: the carrot rust-fly, the bean weevil, the cabbage maggot, etc. They are checked by being prevented from reaching plants in using ingredients the bad smell of which keep them away, or by protecting plants with tarred paper cylinders, etc.

CUTWORMS

Cut plants near the ground.
Control: At night, spread poison bran mash around plants.

WHITE GRUBS

Live in the ground and feed on the roots of several plants.

Control: Plow deep and allow chickens and hogs to run in the newly plowed area.

GRASSHOPPERS

Feed on leaves.

Control: Spread early in the morning poison bran mash mixed with the juice and pulp of three or four lemons or oranges.

PLANT LICE

Suck the leaves.

Control: Spray the lower surface of leaves with sulfate of nicotine.

SLUGS

Stick to the plants and damage them.

Control: Spread lime on the ground.

BLISTER BEETLES

Beetles eating off leaves.

Control: They are destroyed by spraying with arsenate of lead or Paris green.

CABBAGE MAGGOT AND IMPORTED CABBAGE WORM

Lay eggs on leaves out of which come larvae that work considerable damage.

Preventive against the maggot.—When transplanting, place a tarred paper disk of two inches around the base of the plant and resting well flat on the ground.

Preventive against the worm.—Water plants every night, the water being thrown with strong pressure with a rubber hose equipped with a nozzle and this in view of ridding leaves of the eggs that might have been hatched.

CHAPTER III

INSECTICIDES

(or ingredients to control insects)

Arsenate of lead.—Poison used to destroy caterpillars and beetles.

Formulae: Powder arsenate, 2 lbs in 40 gallons of water; paste arsenate, 4 lbs in 40 gallons.

Preparation: Dilute poison slowly so as to obtain a thin paste. Then mix to water or Bordeaux mixture and use. Add sticker so that it may adhere to cabbage, turnip, cauliflower, beet leaves, etc.

Paris green.—Same use and same preparation as arsenate of lead.

Formulae: Paris green, ½ lb.; quick lime, 1½ lb.; water, 40 gallons.

With Bordeaux mixture: ½ lb. Paris green, no lime.

Sulfate of nicotine.—Black liquid tobacco extract, an efficient remedy against plant lice and other sucking insects.

Formulae: ½ lb. of sulfate in 40 gallons of water or Bordeaux mixture.

Poison bran mash.—To destroy cutworms and grasshoppers.

Formulae: Bran, 20 lbs.; Paris green or arsenate, ½ lb.; molasses, 1 quart; water, 2 to 3 gallons.

Preparation: Mix bran and poison thoroughly. Dissolve molasses in water and moisten poisoned bran with this sweetened substance.

Kerosene emulsion.—Is used to control plant lice, bugs and other sucking insects.

Formulae: Kerosene (coal oil), 1 gallon; soap, ½ lb. water, 1 gallon. Shave up soap in 1 gallon of boiling water and add kerosene. Stir during 5 minutes and cool. Dilute into 9 times its volume of water before using, that is, 1 gallon of emulsion to 9 gallons of water.

Pyrethrum.—Whitish powder used in lieu of poisons. It is distributed over cabbages, cauliflowers, etc., without any danger. After 4 or 5 days exposure to the air, it loses all its strength.

CHAPTER IV

FUNGICIDES

(or ingredients to present and control diseases)

Amongst the above mentioned diseases, some may be successfully treated whereas others are practically incurable, that is, efficient means have not been found up to now to control same. We may however prevent most of them by resorting to the following means;

1.—In using seed from healthy subjects only, or in case of doubt, in disinfecting the seeds purchased in formalin before sowing.

2.—In alternating crops from one year to another without awaiting that diseases spread to do so.

3.—In destroying all infested subjects as they are discovered.

4.—In clearing the soil, each fall, of all vegetable refuse which are found after the crop.

5.—In providing plants with the various elements they need in order to develop, through drainage, irrigation and aeration of the soil and by a sufficient addition of the fertilizers missing in the soil and particularly suited to each kind of plant.

In acting in this manner we will prevent the appearance of incurable plant diseases such as the bacterial wilt, blight, anthracnose, powdery scab, black leg mosaic, etc.

As regards other diseases, such as mildew, common rust, etc., they will be effectively controlled in every case with Bordeaux mixture which is, without any doubt, the most powerful fungicide discovered to date and of which you will find the formula in a further paragraph. But it must always be remembered that it is preferable to prevent than cure.

Formalin.—Liquid chemical also called Formaldehyde, used to disinfect potato and cereal seeds. For potatoes a solution is prepared of 1 pint of formalin to 30 gallons of water. Potatoes are put in bags and soaked into this liquid during two hours. They are afterwards set to drain before sowing. It is of the greatest importance that only disinfected receptacles be used to receive the treated seeds.

Bordeaux mixture.—This mixture prevents and controls diseases developing on plants. It is advantageously used for all vegetables and particularly for potatoes, tomatoes and beans.

Formulae: Copper sulfate (bluestone), 4 lbs.; quick lime, 4 to 6 lbs.; water, 40 gallons.

Preparation: 1°. In a barrel containing 20 gallons of water, dissolve the blue stone put into a bag soaked in water. 2. Slake lime slowly in a pail and pour through a strainer, into a second barrel also containing 20 gallons of water. 3. Pour these two solutions at the same time into a third barrel. Stir hard and then use. Insecticides (Arsenates, Paris green, nicotine sulfate) are easily used when mixed with Bordeaux mixture. Insects and diseases are thus controlled by a single operation.

Sulfur.—Powder sulfur is excellent to prevent mildews. Plants are sprinkled with an atomizer or otherwise.

Notes.—When spraying vegetables, we must add to all these solutions (except kerosene emulsion) a sticker thus composed: boil together for 2 hours 2 lbs of resin and 1 lb. of sal soda into 1 gallon of water; this quantity is sufficient for 40 gallons of water. Formulae given are sufficient for a garden of one acre. It is an easy thing to reduce the formula in accordance with the area of the garden. We will divide by 2, 3 or 4, as the case may be.

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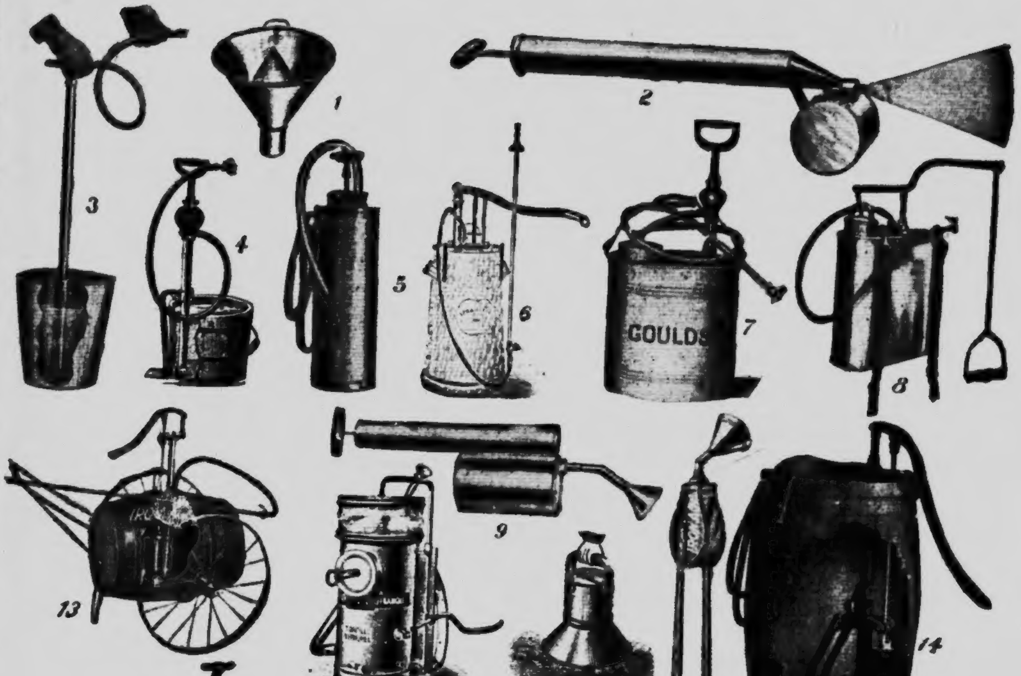

Various apparatus used in applying insecticides and fungicides

Figs: 1.—Strainer; 2.—Compressed atomizer; 3 and 4.—Hand spray pumps; 5.—Compressed air sprayer; 6 and 7.—Hand sprayers; 8.—Knapsack sprayer; 9, 10, 11 and 12.—Powder guns to apply parasiticide powders; 13 —Barrel sprayer on wheels; 14.—Ordinary sprayer, with one piston (vertical) Mounted on 40 gallon barrel; 15.—Two piston ot double acting sprayer; 16.—Sprayer, with one piston (horizontal), adopted to a 100 gallon red pine tank; 17.—Double-acting sprayer adapted to a 100 gallon metal tank; 18.—Combined wheelbarrow and sprayer; 19.—Four-row attachment adapted to an ordinary sprayer to spray vegetables: 20.—Horse sprayer with removable wheels for spraying vegetables (four rows at one time); 21.—Horse power sprayer (five rows at one time.)